

Another U.S.-Brazil trade dispute looms

BY ANDREW WHITLEY

ANOTHER BRUISING trade dispute between the U.S. and Brazil is looming over charges that the Brazilian government has unfairly aided the development and export of the country's most successful civilian aircraft, the Embraer Bandeirante.

Textiles, shoes, sugar and steel products are all on the current list of headaches between the two countries. With the exception of steel, where the U.S. has dropped five out of six specific complaints, all the other disputes are virtually deadlocked.

Fairchild Industries, the struggling U.S. aircraft manufacturer, has formally asked the U.S. government to impose countervailing duties on the Bandeirante, an 18-seat commuter aircraft. These duties could add up to 44 per cent to

its sales price in the U.S., according to Fairchild estimates.

The petition is now with the U.S. Department of Commerce and the International Trade Commission which will determine whether there is a case to answer. The ITC has 45 days to come up with its findings following the lodging of the Fairchild petition on August 13.

Fairchild makes clear that it regards its complaint against the Brazilian manufacturer as a test case. Government officials believe the outcome could encourage the major U.S. manufacturers, Boeing or Macdonald Douglas, to take similar action against their main foreign competitor, Europe's Airbus Industrie.

The petition from Fairchild Swearingen, a subsidiary of

Paul Cheeseright reports on a UK company in a new series of occasional articles about consultants at work Facing up to a tougher future

BRITISH CONSULTANTS have had a good run, but they are facing a difficult decade, according to Mr Des Sainsbury, a director at W.S. Atkins, one of the biggest of the UK consulting groups.

Invisible earnings from consulting engineers have risen steadily to £487m last year from £401m in 1979. This year, according to the Association of Consulting Engineers, new work is keeping ahead of work finishing off and there could be a 12 per cent rise in earnings.

The immediate problem for the consultants, the Committee on Invisible Exports noted, is that margins are still under great pressure from rising salaries and local expenses.

Against this, there has been some reduction in interest rates and inflation which, noted Atkins, was coupled with a fall in the value of sterling and has improved competitiveness. The group's pretax profits in the year to last March rose sharply to £1.6m from £794,000 the year before.

But in the longer run, there

is increasing competition to be faced from engineering consultants of all nationalities. Mr Sainsbury observed that Atkins is competing more with consultants from, for example, Brazil, India, the Philippines, and the East bloc.

The solution, he suggested, is to move to higher value work in high technology areas and in top level management.

The way in which this works in practice was evident at the developing steel complex at Misurata in Libya. Dastur of India won the general consultancy contract early on, but now that the Libyan authorities are committed to heavy spending in a sector of which they have no first hand experience, Atkins has been called in.

The contract it has won provides for technical and project management assistance. Personnel from the group have been welded into the management teams to help control of the project and monitor the cost and quality of the contractors' work.

Atkins' involvement in Libya

is no accident. It has been cultivating the North African markets for 20 years. Indeed, last year it completed what is believed to be the most valuable consulting contract ever granted to an independent group.

Since 1969 it had been working on the El Hadjar steelworks expansion project for Société Nationale de Sidérurgie of Algeria — a contract which lasted so long, it took 2m man-hours of work by Atkins' specialists.

The Algerian contract was partly instrumental in encouraging Atkins to develop the North African markets, but the group's activities are worldwide. It had a 1981-82 turnover of £46.9m, of which 43 per cent came from overseas.

At any one time, both at home and abroad, the group can be working on more than 250 contracts. Each has a project manager, responsible to a project director and a senior director who would be responsible for operations in a distinct geographical area.

The project manager pulls together from within the group the resources needed for a particular task. Atkins, from its base in Epsom, Surrey, has a total of 3,000 personnel split into divisions corresponding to particular disciplines and sectoral activities.

Atkins is best known for its work in the steel industry. Mr Sainsbury noted, and it tends to have knowledge of the projects being considered around the world and when they will come up.

In the case of the Misurata steel complex, Atkins knew five years ago that the Libyan Government was planning a development, so it maintained contact.

On capital projects like Misurata, total consultancy costs to the buyer could amount to between 2 per cent and 7 per cent of the total outgoings. The consultancy work will go through several phases, starting with basic feasibility studies, through project development to project management.



Atkins is often in competition with plant contractors for feasibility studies, which Mr Sainsbury said, might be offered free, although their price would be wrapped up in the possibility of plant sales. "The original conceptual work needs to be done by a consultant independently. It sets the project in the market place."

Contractors have a basic interest in making and selling equipment; their minds are not geared conceptually, according to Mr Sainsbury. "All contractors' efforts are on the physical side—they don't think in terms of the market or the product mix."

For a consultant, the question is how to establish what a client needs and how the need can be met. "If you have 100 people on an air route, you don't need a jumbo jet."

EEC reaches deal with Turkey on cotton yarn exports

BY GILES MERRITT IN BRUSSELS

EEC-TURKISH relations are expected to improve discernibly as a result of the new bilateral arrangement reached between Brussels and Ankara on Turkey's cotton yarn exports, and a mutual agreement to drop restrictive measures that had stemmed from their cotton row.

The European Commission has now negotiated a special export restraint deal with Turkey that will for this year limit Turkish cotton yarn sales in the EEC to an overall figure

Japan steel mills deny dumping charges

THREE MAJOR Japanese steel mills have denied a dumping charge by the U.S. Commerce Department. Sumitomo Metal Industries, Nippon Kokan I.K.K. and Sanyo Special Steel, were commenting on the reported preliminary ruling that heat-resisting and stainless pipes and tubes from the Japanese mills were sold in the U.S. below their fair market value.

The preliminary ruling is the result of the Commerce Department's investigation of a dumping complaint by Babcock and Wilcox Company of Beaver Falls, Pennsylvania. The Department said the dumping margins ranged from 0.62 per cent to 10.14 per cent of the product's value.

Dumping occurs when steel is sold at a price below that charged in the exporters home market or below the manufacturers costs of production.

As a result of the preliminary ruling last week importers of such tubular products from the three Japanese mills will be required to post bond equal to the dumping margin—effectively raising the price of the products to fair value.

U.S. officials said more than 24,000 net tons of the pipe and tube products worth about \$88m were shipped into the U.S. last year. But they were unable to say how much of that steel was covered by the ruling.

A final ruling is due by November 1. If today's finding is upheld, the bonding requirements could be received by permanent penalty duties.

Agencies

SHIPPING REPORT Hopes for market balance

BY ANDREW FISHER, SHIPPING CORRESPONDENT

WITH A record amount of tanker tonnage—some 55m deadweight tonnes—laid up because business is so slack, the market could return to balance earlier than expected.

Such hopes, however, have no immediate impact on the currently depressed rate structure in the charter market, commented E.A. Gibson Shipbrokers in its weekly review.

But a number of factors are combining to reduce the large tanker surplus. As well as the laid-up vessels, some 13m dwt are used for storage and an unspecified number simply trading uneconomically.

Already this year, 15m dwt have been scrapped—more than the figure for all of 1981—and the new building programme is very light.

Thus, it adds, "the equilibrium for modern efficient units acceptable for today's trading should be reached earlier than perhaps previously envisaged."

Motorola urges action on Japanese bleepers

BY LOUIS KEHOE IN SAN FRANCISCO

MOTOROLA Inc. of Schaumburg Illinois has filed a petition with the U.S. Commerce Department and the International Trade Commission asking for anti-dumping action against a Japanese manufacturer of pagers—the bleeping message dictation devices. According to Motorola, Japanese entry into the \$400m (£235m) U.S. market, for pagers in late 1981, caused a precipitous price drop.

Motorola says that in October 1981, Matsushita introduced a pager device in the U.S. selling here for \$79 to \$90. An equivalent Matsushita pager was priced at \$215 in Japan at that time. Motorola contends. The Matsushita devices were immediately successful in the U.S. market. Motorola says that Matsushita took orders for 25 to 30,000 units in October 1981.

Thyssen wins £101m project in Saudi

A UNIT of the diversified Thyssen steel group has received a DM 435m (£101m) order to erect a big commercial centre at the Saudi Arabian port city of Jeddah.

The order went to Thyssen Saudi, a subsidiary of Thyssen Rheinisch Technik GmbH, the engineering company in the Thyssen group that supervises execution of the project.

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World Economic Indicators

FOREIGN EXCHANGE RESERVES (U.S.\$m)				
	June '82	May '82	Apr. '82	June '81
UK	10,574	11,134	11,644	14,837
Belgium	2,262	2,183	2,203	4,886
Italy	12,859	11,482	11,420	15,870
Netherlands	7,146	7,463	7,559	7,616
West Germany	37,408	38,045	37,624	44,618
Japan	21,782	22,801	23,102	24,245
U.S.	9,900	9,150	9,150	10,751
France	13,669	15,260	17,439	27,261

Source: IMF.

INSURANCE

Problems of brokers' in-house schemes

BY JOHN MOORE, CITY CORRESPONDENT

THE REVELATION last week by Alexander & Alexander Services Inc, the U.S. insurance broker, that insurance company subsidiaries within its new UK acquisition Alexander Howden Group are under-reserved, highlights the problems which can arise if brokers attempt to operate in-house insurance company activities.

Insurance brokers buy insurance on behalf of clients from insurance companies. They are expected by the clients, who range from individuals to multinational companies, to place clients' business in secure markets at competitive premium rates.

The brokers are not remunerated by their clients but are paid commissions by the insurance companies or other insurance interests, such as Lloyd's of London underwriting syndicates, into which they place their business.

Insurance companies earn their money by attempting to make sure that the premium flowing to their groups are not exceeded by the insurance claims they have to pay out.

In an era of historically high interest rates, many insurance companies are prepared to take an underlying underwriting loss on their business to serve market share by offering competitive insurance rates. The money which they earn on invested premiums usually enables them to show an overall profit.

In the UK insurance brokers have in recent years been keen to develop their own in-house insurance company operations. In doing so the brokers hope to enhance the amount of revenue which can be generated by any one big ticket account, such as the insurances of a major industrial company, or secure smaller lines of insurance business for their own group which look like being extremely profitable (that is, where insurance claims are not likely to exceed premiums).

Some brokers in the UK have created a number of insurance company underwriting facilities in addition to their management of Lloyd's of London underwriting syndicates. In their integrated organisations, brokers arranging insurance cover may choose to start their insurance programme with their syndicates at Lloyd's of London. Usually, however, they prefer to become more closely associated with the more remote insurance programmes of

their Lloyd's underwriting syndicates or lines of other re-insurance business.

As a broker places a piece of business he takes a commission. If he arranges a complex re-insurance programme on a big account he will be using many companies offering reinsurance. In placing the risk he could be taking a commission many times over on any one piece of business.

If the broker is arranging the reinsurance programme with his own insurance companies, he will, in effect, be converting risk-bearing insurance premiums into non-risk bearing insurance broking commissions for his own group.

This way he gets the best of all possible worlds. The subsidiary companies are always likely to appoint the parent broker as the placing broker on major reinsurance accounts rather than other independent brokers. The subsidiary insurance companies should receive profitable business.

This form of premium stripping only works when insurance business is likely to be profitable. Things can go wrong. A freak series of very large claims—for example, on computer leasing insurance business or asbestos—will mean that re-serves of the brokers' in-house insurance company subsidiaries may not be sufficient to meet claims.

This is because, as the insurance business has been threaded in and out of in-house companies and back again, so the cost of commission payment paid out of premiums to the brokers, will have risen dramatically.

The acquisition moves by U.S. brokers in the late 1970s were prompted by the realisation that UK brokers, with large Lloyd's of London insurance company interests, were making huge amounts of money on these forms of captive commission arrangements.

The U.S. brokers were producing enormous amounts of re-insurances and other business for Lloyd's in the mid-1970s because insurers in the U.S. had to lay off risks after falling stock market values had eroded their reserves.

Now, while U.S. brokers have gained a larger share of the world commission cake through their acquisitions of UK brokers, they are finding that strict financial controls are needed if broking and underwriting are to be successfully reconciled.

India rejects attack on trade regime liberalisation

By K. K. Sharma in New Delhi

THE INDIAN Government has rejected complaints by domestic companies that foreign concerns are taking advantage of its liberal trade policy to dump their products in the country.

The complaints relate mainly to imports of soda ash and polyester and viscose fibres, the prices of which have fallen sharply following a glut. The government has rejected complaints that free imports of such raw materials has adversely affected domestic interests.

One reason for the rejection was that the imports were welcomed by user industries which claimed that domestic producers had raised prices to show that cheap imports were affecting sales and capacity utilisation.

Taiwan eases curbs on Japan

TAIPEI—Taiwan has lifted restrictions on 842 Japanese consumer and fishery products, economic officials confirmed yesterday.

The economic ministry announced late on Saturday that Taiwan would resume imports of the 842 Japanese items as a first step to honour its commitment to phase out restrictions it had earlier placed on 1,500 Japanese products.

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Resorts look for 'instant success'

SEASIDE HOTELS and guest houses in many British resorts this year are suffering the first full effects of the recession. The unemployed's redundancy payment blow-out on holidays by the sea, which has cushioned trade over the past two years, is tailing off.

It's not the English seaside we like to be beside in recessionary times, reports James McDonald

The loss of business from a big proportion of the unemployed, together with the longer term effects of a radical change in the pattern of British holidaymaking, is forcing the seaside to look closely at what it has to offer and how it can sell itself.

disliked and rejected by many hotel and guest house owners. A pilot scheme has been operating for two or three years but only last year, after two bad seasons, has it gained wider support.

The British holiday often takes second or even third place. For those who have taken a main summer holiday by the Mediterranean, the British seaside resort has to compete with other British tourist attractions.

Resorts, hotel and guest house owners are showing more interest in the idea of promoting themselves through the High Street travel agent alongside the overseas package holiday operators who have taken away much of their business over the past few years.

Just how bad seaside business has been is difficult to estimate, although even in the last few traditional peak season weeks vacancy signs could be seen outside hotels and guest houses in many towns.

The percentage of all holidays in England by Britons spent at the seaside has declined from 39 per cent in 1973 to 36 per cent last year. Holidays in London on the other hand, rose from 6 per cent to 8 per cent over the same period and holidays in other large inland English towns increased from 11 per cent to 12 per cent.

Next year, about 12 resorts, including mighty Blackpool and Scarborough, are joining a project called "Holiday UK", offering hotel and guest house holidays through travel agents, and also in the "Instant Booking" scheme under which seaside holidays can be booked through tourist information offices in inland cities and towns.

Besides the recession, the weather has played a part in the drop in trade. A number of resorts had fairly good business with fine weather in March and April but then weather and trade deteriorated. Fine weather also coincided with the start of school and industrial holidays and most resorts began filling up.

Moreover, many of these holidays are short breaks of two or three days and seaside hotels and guest houses have had to adjust—rather slowly in many cases—to this change and solicit mid-week and long weekend bookings.

Both schemes are supported by the English Tourist Board and by the British Resorts Association. Mr. Michael Montague, chairman of the latter, is fond of saying that it is easier to find Blackpool residents to book holidays in Benidorm than in their own town.

But this fluctuation itself reflects the basic change in the pattern of British holiday-making. Until a few years ago resorts expected people to react to their national Press advertising campaigns in January and February, to send off for a resort's brochure, choose a hotel and book a good five months or more in advance.

Another disadvantage British resorts face is that Britons who have been abroad expect private toilet facilities with their accommodation. British resorts have a long way to go before this becomes a standard facility in most medium sized and large hotels.

The use of travel agents on commission, however, is still

Many people now leave decisions for a holiday in Britain until the last minute. Their main holiday is often foreign and they are more likely to book that early than book a second British one.

Many hotels and guest houses are trying to remedy this deficiency and the recent Government decision to allow

grants to be made outside the industrial areas under Section 4 of the Tourism Act will be a stimulus.

The Tourist board has only about £5m available for grants this year but even this amount should be useful as a pump primer for investment by hoteliers in improved facilities.

A number of resorts are going to considerable lengths to attract trade with special events and attractions. Scarborough, with state aid, has spent about £10m on conference and hotel facilities. Geographically it is hampered by the depressed industrial Midlands and the North and it has been beaming much of its promotional publicity to the south and west of England.

Blackpool, also traditionally dependent upon the industrial Midlands and the North West and North, experienced comparatively good business in March and April but then went through a very bad patch. In fact, the town council used £125,000 of next year's tourism budget for an advertising campaign.

"Business took off nearly four weeks ago and, with school holidays and lovely weather coinciding, we are doing good trade now," said a tourism spokesman.

Blackpool is still keeping its fingers crossed for that it has invested heavily in a long eight weeks "late season." About £370,000 has been spent on the famous lights and illuminations which will be switched on on September 3.

BUSINESSMAN'S DIARY

Table with 3 columns: Date, Title, Venue. Includes Motor Cycle Show, International Hardware Trades Fair, International Watch, Jewellery, and Silver Trades Fair.

UK TRADE FAIRS AND EXHIBITIONS

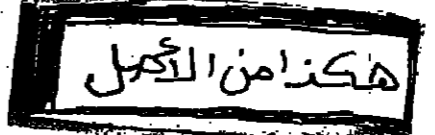
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OVERSEAS TRADE FAIRS AND EXHIBITIONS

Table with 3 columns: Date, Title, Venue. Includes International Men's Wear and International Jeans Fair, International Autumn Fair, Fashion Samples Fair.

BUSINESS AND MANAGEMENT CONFERENCES

Table with 3 columns: Date, Title, Venue. Includes Management Training Consultants, Oyez/IBC Deep water pipeline technology, Management Centre Europe.



Cohse may recall conference to seek escalation of health dispute

BY DAVID GOODHART, LABOUR STAFF

THE EXECUTIVE of the Confederation of Health Service Employees will meet later this week to discuss the possibility of recalling its annual conference to endorse an escalation of the 15-week health dispute.

Health service union leaders believe the dispute must be brought to a head as soon as possible, but the meeting of the TUS health services committee on Thursday is unlikely to back moves for an all-out strike.

emergency resolution to the TUC Congress in Brighton next month calling for the strike to be spread into other industries. Mr Bob Jones, NUPE national officer, said yesterday: "We don't want to see this dispute lingering on. A number of consultants have told us that the longer it lasts the more difficult it will be to repair the damage—so we want to bring it to a head."

But under continuing pressure from the National Union of Public Employees, to back an all-out strike Cohse may decide to recall its delegates.

Management and union officials are due to meet today in Derbyshire to try to end an ambulance-men's strike over a bonus payment row.

Mr Jack Baddy, national secretary of the Transport and General Workers Union's farm-workers section, has urged his 90,000 members to back the health workers' 12 per cent claim in any way possible.

Talks today on pay row in Mersey docks

By Our Labour Staff

THE LIVERPOOL Port Employers' Association will meet the Mersey Docks shop stewards today in an attempt to stop a possible vote for strike action at a mass meeting of the Mersey's 2,500 dockers tomorrow.

Postal workers' leaders face secret ballots

BY DAVID GOODHART, LABOUR STAFF

THE POSTAL workers' union has changed its rules to ensure that all full-time officers of the union, including the general secretary, face a compulsory election every five years by secret ballot.

The change was agreed at the Union of Communication Workers' rules revision conference by 90,730 votes to 73,620 this weekend. The rule affects only newly-elected officers and does not apply to the union's 18 full-time officers who have been elected for life.

Waterways freight survey

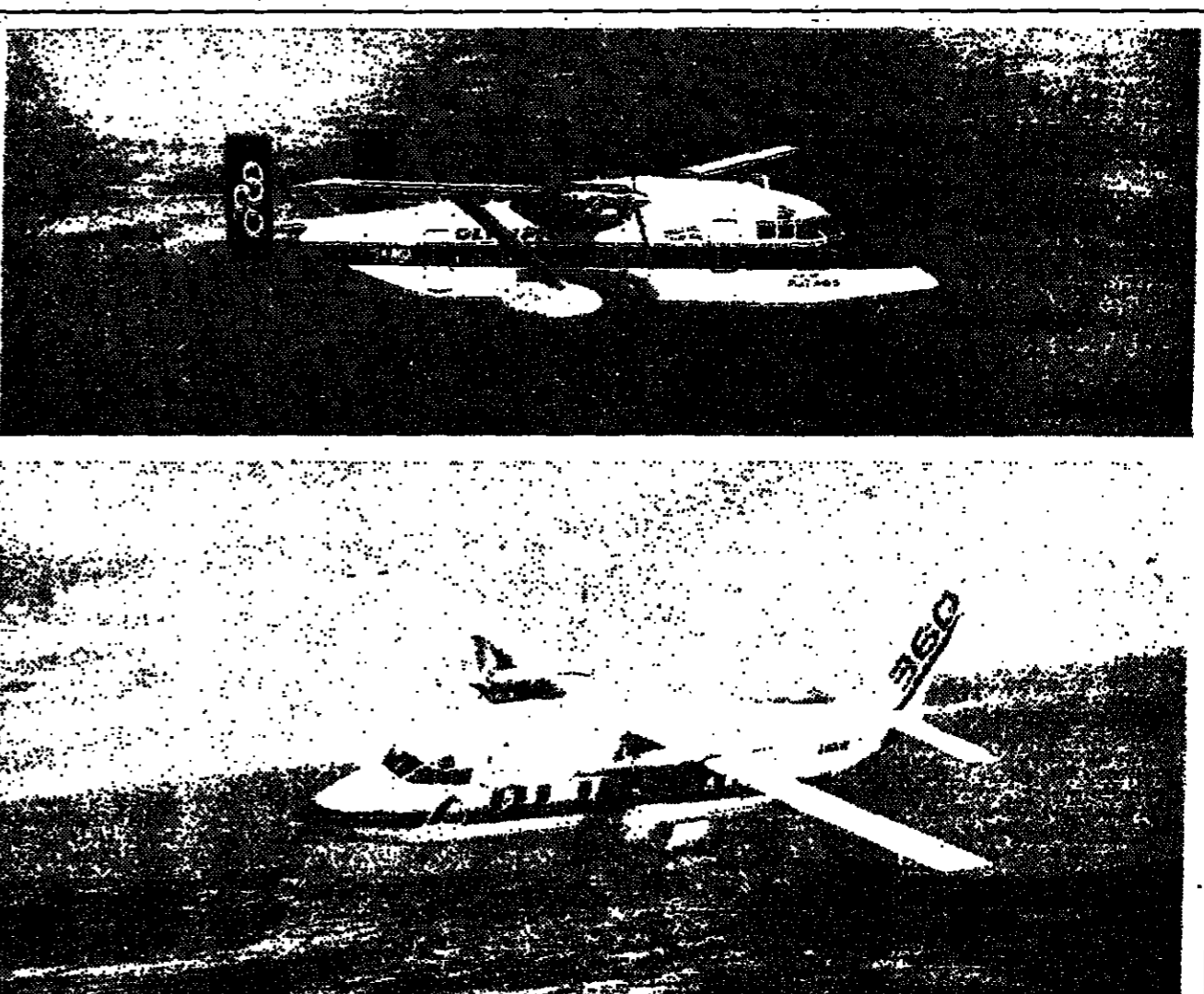
By Andrew Fisher

BRITAIN'S inland waterways carry over 60m tonnes of freight a year, according to the first official survey of such traffic in the UK.

The survey was compiled for the Departments of Transport and the Environment by Liverpool University's Marine Transport Centre.

It says traffic carried on inland waterways accounts for 1.5 per cent of UK freight when measured in tonne-kilometres. In 1980, 62m tonnes of freight went on inland waterways and estuaries, or 2.3m tonne-kilometres.

Of the 2,350 km of waterway track recorded, in the survey, 31 per cent was not used by freight traffic in 1980.



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SHORTS

'Crazy' EEC finances attacked

By Our Labour Editor

THE TUC has cast its first stone in a so-far low key campaign against UK membership of the European Economic Community.

A leaflet published to coincide with Congress concentrates on the EEC's "crazy finances" and says it is "time to cry halt."

BL firemen fail in jobs appeal

By Our Labour Staff

EIGHT BL firemen who were sacked after allegations that they slept on duty have failed to win their jobs back.

An internal appeals tribunal ruled that the dismissals must stand despite representations from a full-time union official.

The firemen, members of the Transport and General Workers' Union, were sacked from the Land Rover plant in Solihull, West Midlands, after a sput check earlier this month.

A Land Rover spokesman said: "The men were dismissed for conduct considered to be in breach of duty."

Rate

Anyone wishing to attend any of the above events is advised to telephone the organisers to ensure that there has been no change in the details published.

BUILDING AND CIVIL ENGINEERING

Slump in cavity wall insulation

ORDER BOOKS of cavity wall insulation companies have slumped by as much as 75 per cent.

The Association, however, says that there is no medical evidence of long term health hazards from urea-formaldehyde vapour.

The Association said that recent checks on homes with UF-foam insulation had shown readings of formaldehyde vapour from household and consumer goods.

The National Cavity Insulation Association which recently has been receiving up to 50 telephone calls a day from concerned home-owners.

There is no doubting the serious damage that has been done to the industry as a result of a series of newspaper and television reports on the use of UF-foam in cavity wall insulation.

Mr David Porter, managing director of Coswall Limited, said that in the seven weeks since the ITN broadcast.

Mr Porter said that he would be able to survive because of his other business interests in stone cladding and in wood-worm, dry rot and dampness treatment.

There have also been reports of problems with some UF-foam insulated buildings in the UK.

Mr Cameron said that sales of other home insulation products, unconnected with UF-foam, had been adversely affected by the recent publicity.

Mr Ken Johnson, managing director of Warmwall, which installs a wide range of insulation products in the domestic market, said that orders at his company had fallen by about 45 per cent in the past two months.

Mr John Baker of John Baker Insulation said that turnover at his company was now running at around £200,000 a year.

Mr Baker, who is also chairman of the National Cavity Insulation Association, said: "The industry will survive. It has had these setbacks before."

A COMPANY formed five months ago to build homes for sale will start soon on an £8.5m development.

There is outline planning permission for homes on the site, which the company is developing in association with R. H. Wales, of Gamlingay.

The St Neots site is about 3.5 miles from the town centre, close to two schools and a parade of local shops.

BOUYANT in the north east is the BOWEY GROUP, comprising four housing co-ops.

Leading the projects awarded to the general building side is a conversion and upgrading office accommodation scheme at Tanfield Lea for Ever Ready (GB).

New housebuilder wins major project

FOUR CONTRACTS, together worth nearly £3m, have been awarded to TARMAC regional construction companies.

MOWLEM'S E. THOMAS & COMPANY of Ponsanooth, Truro and Newton Abbot, is forecast another successful year with the announcement of £2m worth of new business.

CONTRACTS VALUED at £4.8m have been awarded to companies in the CARWRIGHT GROUP.

OSORY ROAD Developments has awarded the main building contract of around £3m for the Colindale shopping centre.

UK CONTRACTS

NEW BARCLAYS Bank in Crumlington Town Centre and a Mobil Oil petrol station also in Newcastle.

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Bryant construction

Tailored space for businesses SOLIHULL READING

Around the industry

THE FIRST seminar and forum on phenolic insulation to be mounted by the materials manufacturing trade association, the FIMA.

UNDAUNTED by the recession, Shore Trench Systems is continuing to expand its business.

A TOTAL of 32 students have passed the 1982 Guild of Architectural Ironmongers third year examination.

TERRAPIN has created a new subsidiary company, Bond Estates, to manage and develop the group's 22 acre Milton Keynes freehold site.

SCHWEPES has awarded contracts worth over £2m to Newcastle-based builders P. WHEELAN to build a £1.7m production warehouse.

Falklands airstrip: learning from the past

REPORTS that the Government is considering a new 11,000 ft airstrip for the Falkland Islands has revived memories of the building of the present Port Stanley airfield by Johnston Construction in 1975.

Johnston Construction, part of the Reigate based Johnston Group, the engineering, building materials and contracting company, had the benefit of building the existing Port Stanley airfield when more peaceful relations existed between Britain and Argentina.

None the less the company still had to resolve the problems of building a 4,000 ft asphalt runway, airport terminal facilities, and a 5 km road in a windswept and remote part of the South Atlantic more than 8,000 miles away from Britain.

supplies and materials we would need for an 18 month building contract. We even took our own coal to fire the temporary homes shipped out to house the construction team," says Mr Martin King, managing director of Johnston Construction.

"Sailings to the Falklands then took place about every three months, so it was no good thinking of shipping back to London for anything that had been forgotten. Smaller components, however, could be flown out if necessary."

The only other materials imported into the Falklands by the company were cement and bitumen for the runway and the road connecting the airfield with the town of Port Stanley.

could be a major headache if plans to build the new airstrip go ahead.

Johnston also used some Argentine labour to complete the £5.4m contract. Some of the Falkland islanders also worked on the project, together with a team of about 40 sent out from Britain.

"The Falklanders were a useful addition to our team and proved very resourceful with machinery and plant which had broken down in some of the arduous conditions we had to deal with. We never lost a single day's work throughout the entire project," says Mr King.

unpleasant. It is very windy and when it rains it is coming at you almost horizontally.

"All the stone we needed was quarried locally on the Falklands and as the local rock was pure quartzite, the wear and menial, but with the able assistance of some of the Falklanders and our own engineers we were always able to keep things going."

Johnston's experience of conditions on the Falklands has already proved useful to the military now in the process of

extending the existing war-damaged Port Stanley airstrip from 4,000 to 6,000 ft.

If plans for a new runway go ahead—and a survey of possible sites is already underway—it seems likely that the airstrip will be built away from the present airfield.

Johnston would clearly like to have a second bite at the cherry if the new airstrip is built. "We would obviously like to assist in any rebuilding project on the Falklands. We have very many happy memories of our time there," says Mr King. "It was rather a unique experience."

Hayward & Wooster, Bath, has gained two housing projects and has also won Phase III of the Bath City Council's Whiteways Housing Development, which is valued at over £500,000.

Cartwright Construction has won housing projects from both the Leeds City Council and Kirkcaldy Metropolitan Council.

OVERSEAS CONTRACTS

First Nigerian job for Sir Alfred McAlpine

SIR ALFRED McALPINE (OVERSEAS) is to work in Nigeria for the first time in the company's history.

The contract will be funded by a loan to the State, led and syndicated by the Midland Bank, and composed partly of an ECGD supported export credit and partly of a Eurocurrency credit.

Balfour Beatty Engineering is the managing contractor for the Plateau State Government.

McAlpine says that the contract is expected to take about 2½ years to complete.

Balfour Beatty Engineering is the managing contractor for the Plateau State Government.

McAlpine says that the contract is expected to take about 2½ years to complete.

THIS YEAR'S London Building and Construction Show which opens on September 21 at the Bloomsbury Court Hotel, Russell Square, W.C.1.

REPUBLICQUE DE HAUTE-VOLTA Unite-Travail-Justice MINISTERE DES TRAVAUX PUBLICS, DES TRANSPORTS ET DE L'URBANISME DIRECTION GENERALE DES TRAVAUX PUBLICS TENDER No. 02-12-TP-82

KINGDOM OF MOROCCO OFFICE NATIONAL DE L'EAU POTABLE CALL FOR TENDER No. 4/D/SP/82 RECRUITMENT OF CONSULTANT IN THE FIELD OF DRINKING WATER

EQUIPMENT FOR SMALLHOLDER SUGAR DEVELOPMENT Tenders are invited for the supply of the following equipment to be financed by the African Development Fund.

ALGERIAN PEOPLE'S DEMOCRATIC REPUBLIC MINISTRY FOR ENERGY AND PETROCHEMICAL INDUSTRIES NATIONAL DRILLING COMPANY E. N. A. F. O. R. NOTICE OF INTERNATIONAL CALL FOR TENDERS No. IN 19.82

INTERNATIONAL NOTICE OF CALL FOR TENDERS For the supply of MINING EQUIPMENTS - METALLURGICAL PLANTS No 82/8 - 82/7 - 82/6

KINGDOM OF MOROCCO OFFICE NATIONAL DE L'EAU POTABLE CALL FOR TENDER No 26/DE/82 SUPPLY OF DRINKING WATER TO THE TOWN OF AL HOCEIMA AND AREA

PEOPLES DEMOCRATIC REPUBLIC OF YEMEN PUBLIC CORPORATION FOR ELECTRIC POWER HEDJUF NEW 11KV SUBSTATION

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CONTRACTS & TENDERS ADVERTISING APPEARS EVERY MONDAY THE RATE IS £27.50 per single column centimetre

BBC 1

6.40-7.55 am Open University (Ultra High Frequency only) 9.20 Scooby and Scrappy Dog 9.40 Jackanory 9.55 The Wombles 10.00 Take Hart 10.20-10.30 Play Chess 1.00 pm News After Noon 1.30-1.45 Postman Pat 3.40 Home On Sunday 4.18 Regional News for England (except London) 4.20 Play School 4.45 Herby It's The King 4.55 John Craven's Newsround 5.05 Ticket to Ride 5.35 The Pershires 5.40 News 6.00 Regional News Magazines 6.25 Best of the West - The Wild West as it really was! 6.45 Comic Roots: Paul Shane's Rotherham 7.20 Star Trek starring William Shatner and Leonard Nimoy 8.10 Panorama: Searching for the New Zimbabwe 9.00 News 9.25 Play of the Month: 'The Critic' a satire starring Hywel Bennett, Norman Rodway and Nigel Hawthorne 11.13 News Headlines 11.15 BA in Music: 'The Guitris' with B. A. Robertson 11.45 Cycling: The World Championships from Leicester

TELEVISION

Tonight's Choice

The seamier side of Hollywood gets an airing on ITV at 9 tonight with the first of a three part serialisation of Jacqueline Susann's epic Valley of the Dolls. This is a made-for-television version of the book and film which caused such a stir in the 1960s. However, the passage of time and the dictates of American television has made this version considerably more innocuous. Opposing this on BBC 1 at 9.25 is Sheridan's The Critic in the Play of the Month slot. Like the Valley of the Dolls, with its behind-the-scenes expose of the film industry, Sheridan's play is a comic look at the passions and the intrigue of the theatre world - albeit of two centuries ago. Still, it has stood the test of time well and - since it is so rarely performed - is well worth watching now. Hywel Bennett, Rosemary Leach and Clive Francis star. The BBC 2 alternative at 9 to Susann and Sheridan is a profile of Ted Turner in The Man from Atlanta. Turner is revolutionising the U.S. television system by his use of satellites and cable television: this gives us a sneak preview of what may happen here in the next decade. My personal choice for the evening, however, must be the return of Star Trek to BBC 1 at 7.20. The series may be 15 years old, each episode may have been repeated many times, but to all true Trekkies it remains compulsive viewing.

DAVID CHURCHILL

BBC 2

6.40-7.55 am Open University. 10.30-10.55 Play School. 5.10 pm Crash Course. 5.40 Laurel and Hardy in 'Bean Chumps'. 6.15 'The Silent World'. 6.25 The Philpott File. 7.00 Junior Pot Black. 7.25 News Summary. 7.30 Best of Brass. 8.10 Strauss and Lehar. 9.00 The Man from Atlanta. 9.40 Cartoon Two. 9.55 Third Eye. 10.45-11.50 Newsnight.

LONDON

9.30 am Sport Billy. 9.50 Where Did The Colorado Go? 10.45 Crazy World of Sport. 11.10 Little House on the Prairie. 12.00 Cockleshell Bay. 12.10 pm Rain-bow. 12.30 Under Fives. 1.00 News plus FT Index. 1.30 Thames News with Robin Houston. 1.30 Britannia. 2.00 Monday Matinee: Peter Finch, John Gresson, Anthony Quayle in 'The Battle of the River Plate'. 4.15 Dr Struggles. 4.20 Ragdoll. 4.30 Rowan's Report. 4.45 Watch All Night. 5.15 Different Strokes. 5.45 News. 6.00 Thames News with Rita Carter and David Bellin. 6.25 Help! with Viv Taylor. 6.35 Crossroads. 7.00 The Krypton Factor. 7.30 Coronation Street. 8.00 A. J. Wentworth. BA. 8.30 World In Action. 9.00 Best Sellers: 'Valley of the Dolls' part 1. 10.00 News. 10.30 Best Sellers: 'Valley of the Dolls' part 1 (continued).

APPOINTMENTS

Treasury posts at Midland Bank

Mr David J. Wilkins has been appointed to the new post of senior executive, treasury office, at MIDLAND BANK, with responsibilities for developing foreign currency treasury policies both in London and overseas. Other appointments within group treasury are Mr Christopher J. Carless who becomes a general manager's assistant, Mr Derek E. King who becomes senior executive, currency dealing operations, in succession to Mr Wilkins and Mr Robert G. J. Holmes, formerly chief currency deposit dealer, who becomes senior manager, currency dealing operations in succession to Mr Carless.

Mr C. H. Winter has been appointed to the board of WILLIAMS AND GLYN'S BANK. He is managing director of the Royal Bank of Scotland. Both banks are members of the Royal Bank of Scotland Group.

Mr Brian Downing, managing director of the Women's Magazines Group, is to be deputy chief executive of IPC MAGAZINES. Mr John Mellon, assistant managing director of the Women's Magazines Group, is to be managing director of the group. He also joins IPC Magazines board. Mr Patrick Barnes, managing director of the Youth and Practical Group, is to be managing director of the Leisure Activities Group. Mr Michael Panton, production director of IPC Magazines, is to be managing director of the Youth and Practical Group. The appointments are from October 1.

Mr Clive Hadley has joined the management board of STERLING METALS, part of the Birmid Quacast Foundries group, as director of the iron foundry. He joined Birmid Quacast as an apprentice in 1953, and went on to become sales director before transferring to Sterling Metals in February 1981 as sales manager.

MOTOROLA automotive and industrial electronics group has appointed Mr Fariz Mokhtari as

WEEKS FINANCIAL DIARY

The following is a record of the principal business and financial engagements during the week. The board meetings are mainly for the purpose of considering dividends and official indications are not always available whether dividends concerned are interim or final. The sub-divisions shown below are based mainly on last year's timetable.

Table with columns for COMPANY MEETINGS, BOARD MEETINGS, DIVIDEND & INTEREST PAYMENTS, and FRIDAY AUGUST 27. Lists various companies and their financial events.

All IBA Regions as London

Table listing regional news for ANGLIA, BORDER, CENTRAL, and RADIO 1.

CHANNEL

Table listing Channel news for GRAMPIAN, SCOTTISH, TSW, and HTV.

Supersat Profile

Table listing TV programmes for Monday, Tuesday, Wednesday, Thursday, and Friday.

TYNE TEES

Table listing Tyne Tees news for Monday, Tuesday, Wednesday, Thursday, and Friday.

YORKSHIRE

Table listing Yorkshire news for Monday, Tuesday, Wednesday, Thursday, and Friday.

RADIO 1

Table listing Radio 1 programmes for Monday, Tuesday, Wednesday, Thursday, and Friday.

RADIO 2

Table listing Radio 2 programmes for Monday, Tuesday, Wednesday, Thursday, and Friday.

RADIO 3

Table listing Radio 3 programmes for Monday, Tuesday, Wednesday, Thursday, and Friday.

RADIO 4

Table listing Radio 4 programmes for Monday, Tuesday, Wednesday, Thursday, and Friday.

RACING

THE FORT, who is considered one of Warren Place's best classic hopes by either Cecil or Piggott, ran out a comfortable winner of Saturday's Interark Solaris Stakes, and it is fair to suspect that the form of the one-time 'juvenile classic' could soon be changed. Once the straight had been reached, only The Fort's

DOMINIC WIGAN

market rival Kuwait Tower, decided capable of putting in even a semblance of a challenge. Although it materialised approaching the distance, Piggott already had matters very much under control and The Fort forged clear to put three lengths between himself and his Epsom rival. Cecil has no immediate plans for the winner, saying: 'I will have to feel my way with him.' While The Fort was probably surprising Cecil at Sandown, Soba was doing

WINDSOR

Richard Hannon's twice-raced colt, Reggae, earned some favourable comments from race watchers at Salisbury 11 days ago. The colt, who earned attention following a fourth-place run in a maiden, for which he started at 33-1 in the hands of Roger Werham, looks the one to be on in the Trafalgar Square Sweepstakes.

COMPANY NOTICES

BASS STRAIT OIL & GAS (HOLDINGS) N.L. NOTICE OF CALL. Notice is hereby given that a call of 2 cents per share has been made on all 50c contributing shares paid to 20 cents each in the capital of the Company due and payable on Wednesday, 8th September, 1982, at the Company's administrative office 17-23 Queensbridge Street, South Melbourne, Victoria 3205, Australia.

BANQUE NATIONALE DE PARIS

BANQUE NATIONALE DE PARIS Floating Rate Note issue of US\$ 125 million February 1979/81. The rate of interest applicable for the six months period beginning August 22nd 1982 and set by the reference agent is 11 1/2% annually.

BANQUE NATIONALE DE PARIS

BANQUE NATIONALE DE PARIS Floating Rate Note issue of US\$ 75,000,000 February 1978/84. The rate of interest applicable for the six months period beginning August 21st 1982 and set by the reference agent is 11 1/2% annually.

CLUBS

LEVIN INTERNATIONAL INVESTMENTS N.V. US\$20 MILLION GUARANTEED FLOATING RATE NOTE OFFER. EXTENSIBLE AT THE HOLDERS OPTION TO 1989.

CLUBS

BYE has published the others because of a policy of fair play and value for money. Super from 10.30 am. Disco and two musicians. Glamorous hostesses, exciting atmosphere. 10.30-11.30 pm. THE GARDIENS OF ST. JAMES'S, London's most exciting destination. Night club. Non-competitive dancing. 2 bars, dozens of superbly appointed tables. Entrance fee £2.75. 10.30-11.30 pm. 10.30-11.30 pm. 10.30-11.30 pm. 10.30-11.30 pm.

FINANCIAL TIMES

Head Office: The Financial Times Limited, Bracken House, 10 Cannon Street, London EC4A 3DF. Telephone: 01-5877. Telex: (Advertising) 880333. Telex: (Finance) 880333. Telex: (General) 880333. Telex: (Sales) 880333. Telex: (Distribution) 880333. Telex: (Printing) 880333. Telex: (Post) 880333. Telex: (Telegrams) 880333. Telex: (Cable) 880333. Telex: (Radio) 880333. Telex: (TV) 880333. Telex: (Fax) 880333. Telex: (Mail) 880333. Telex: (Parcel) 880333. Telex: (Express) 880333. Telex: (Registered) 880333. Telex: (Patented) 880333. Telex: (Copyright) 880333. Telex: (All Rights Reserved) 880333. Telex: (No part of this publication may be reproduced without the prior written permission of the publisher.)

INTERNATIONAL & BRITISH EDITORIAL & ADVERTISING OFFICES

Table listing international and British editorial and advertising offices with addresses and phone numbers.

TRONOH MINES MALAYSIA BERHAD

ANNOUNCEMENT TO SHAREHOLDERS. For the second tin export control period from 1st July to 30th September 1982, your company has been allocated quotas amounting to 70,981 tonnes of tin concentrates representing 49.4% of the estimated normal production for the period. In view of the severity of the cutback and the impact of low tin prices, your directors have re-examined the company's production policy to maximise cashflow and profitability whilst minimising hardship to the company's employees. These constraints which have been aggravated further by the marginal ground ahead of No. 1 Dredge, have resulted in a decision to close down this unit temporarily from 18th August 1982 until such time as there is a considerable improvement in the situation. No. 2 Dredge, however, will be able to operate normally and by redeploying the dredge crew no retrenchment of workers is anticipated at this stage.

AYER HITAM TIN DREDGING MALAYSIA BERHAD

ANNOUNCEMENT TO SHAREHOLDERS. For the second tin export control period from 1st July to 30th September 1982, your company has been allocated quotas amounting to 209,876 tonnes of tin concentrates representing 67.2% of the estimated normal production for the period. In view of the severity of the cutback and the impact of low tin prices, your directors have re-examined the company's production policy to maximise cashflow and profitability whilst minimising hardship to the company's employees. The quotas available to the company can only sustain the continued economic operation of two units and your directors have therefore decided to temporarily shut down No. 2 Dredge from 23rd August 1982 and to retrench some employees. The possibility of reactivating No. 2 Dredge will be reviewed when there is a significant improvement in the situation. By order of the board, Abdul Malek Abdul Majid, Secretary, Kuala Lumpur, 20th August 1982.

TELEPHONE

Advertisement for FT INDEX & BUSINESS NEWS REPORT. Hourly updated FT Index, Starting Exchange Rates updated 3 times daily, Bullion, Kruggerands, platinum and base metal prices, Dow Jones Industrial Average, Share Market Report. Telephone: 01-246 8026.

This advertisement complies with the requirements of the Council of The Stock Exchange. It does not constitute an offer of or invitation to subscribe for or purchase any securities.

Advertisement for ANR Finance N.V. and ANR Finance B.V. offering \$50,000,000 15 1/2% Guaranteed Notes due August 15, 1989. Includes list of financial institutions: Goldman Sachs International Corp., Banca del Gottardo, Commerzbank Aktiengesellschaft, Credit Lyonnais, Daiwa Europe Limited, Manufacturers Hanover Limited, Societe Generale de Banque S.A., Swiss Bank Corporation International Limited, Union Bank of Switzerland (Securities) Limited.

MANAGEMENT

EDITED BY CHRISTOPHER LORENZ

Closer together—but still wide apart

Employee consultation has been more prevalent during recession, but a union backlash is feared. John Elliott reports

DURING THE recession the amount of communication between managements and workforces about company problems has often increased considerably. But genuine consultation and participation, in which employees have a real chance of influencing management decisions, has not increased to anything like the same degree.



Co-operation by the workforce "can always improve but I have no complaints," says Harold Musgrove (left) chairman of Austin Rover. Meanwhile, David Buckle, TGWU Oxford district secretary, claims that "at present it's a waste of time putting a view to management that they don't want to hear"



Hugh Routledge

Managers have been keen to cushion the shock of redundancies and closures by spelling out the worst news about potential problems to their employees. But they have often been forced to go ahead and take action without involving the employees in further consultation.

types of issue—for example the location of cycle racks apparently dominated a recent meeting when 170 redundancies were on the agenda.

types of issue—for example the location of cycle racks apparently dominated a recent meeting when 170 redundancies were on the agenda. However, on one occasion nine months ago when a council meeting was widened to include all shop stewards for the annual visit of the Birds Eye chairman, more was achieved. The issue was the removal to Hull of plance processing—the last fish work left in the Lowestoft factory. This would have caused 150 or more job losses, and an emotional debate took place. As a result the employees agreed to co-operate in modernising the plance processing and the company is spending about £300,000 on a new fish grader which will disperse with about 40 jobs.

TECHNOLOGY

First commercial versions of Sony's new disc player are off the production line

Europe waits for Sony's little miracle

BY ELAINE WILLIAMS

SONY REVEALED the first production versions of its revolutionary compact disc player this week. Then it cast a shadow over this achievement by announcing it is to delay the launch of the system in Europe until next year.



Preview of the new compact disc player.

estimated that there will be a market of about 250,000 disc players in the first year of the UK launch.

the disc—whenever it does arrive—will be timely for the record industry which has been facing severe difficulties in recent years. Sales of records have declined over a seven year period from 91m to just over 67m in 1980 in the UK alone.

A company whose customers hope never to use its products Brisco: where 'shutdown' is good business

BRISCO Engineering makes the sort of equipment its customers hope they will rarely have to use—emergency shutdown systems for oil production platforms and pipelines.

Control 'Sitewatch' marshalls the data

LEE-DICKENS of Desborough, Kettering, has developed a simple system to collect information at dispersed points on large industrial or commercial sites and transmit it to a single display location.

Welding Torvac's digital programmer

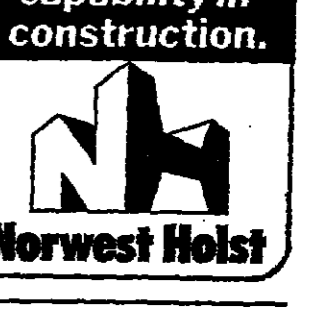
TORVAC HAS announced a new range of vacuum and electron beam welding equipment.

EDITED BY ALAN CANE

Management abstracts

Flexible manufacturing systems. R. E. Young and H. T. Kishor in Industrial Engineering (U.S.), Nov 1981. Defines a "flexible manufacturing system" in terms of computer-controlled machines and transfer devices that can process many types of parts.

Total capability in construction.



Electronics

New zero force connectors

ITT CANNON has launched a new series of zero force connectors designed for 10,000 mating/unmating cycles without failure.

Electronics

How to kill static electricity

STATIC ELECTRICITY spells death to silicon chips, which is why electronic circuit assemblers wear anti-static clothing and earth themselves before handling micro-electronic components.

Memories Rodime and Comart drive disc pact

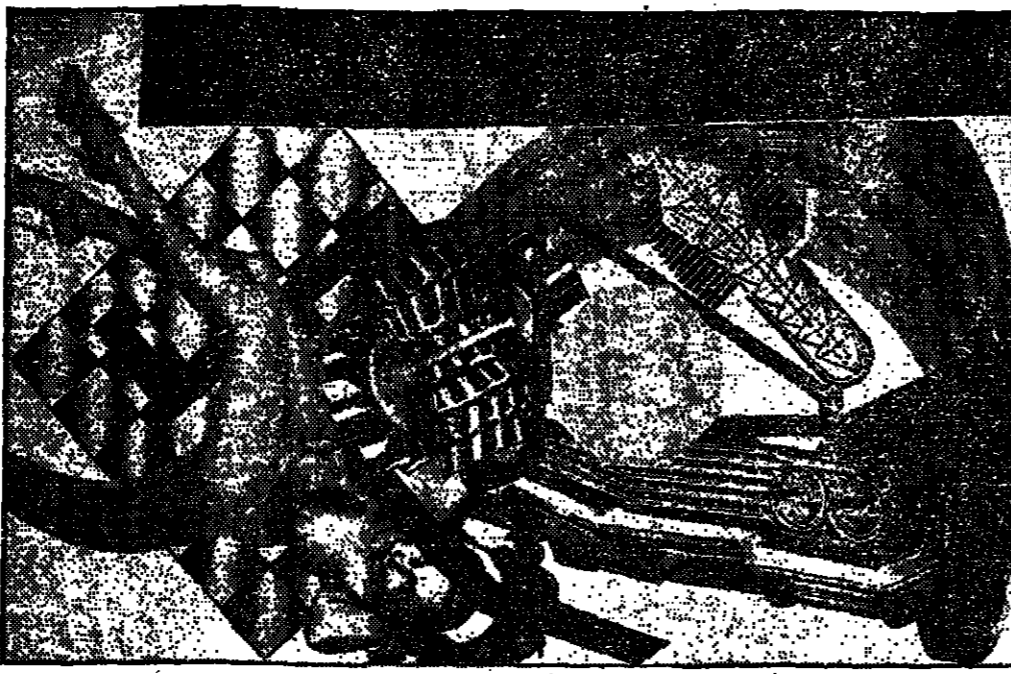
RODIME, THE UK's only indigenous manufacturer of the 5 1/4 inch Winchester disk drive, has been seen as the key to personal computing power in the future.

Office Vdu top file tray

The paperless office may be on the way... but not quite yet it seems. If you want to use the top of your visual display unit as filing space, Imacore, Cheshire, offers a VDU tray in acrylic.

THE ARTS

Museum of Modern Art, Oxford/William Packer
Pop across the years with Peter Phillips



Custom Painting, No 5 1965 by Peter Phillips

The problems of reputation... as various as reputation is... the domestic view of the expatriate is always rather a special case...

Rather he settled in Zurich... and though he has since shown widely enough abroad, here we have had one dealer's show in 17 years and only the occasional participation in prestige assemblies and reviews.

English to those of us who tasted it in its own time... As paintings they are curiously complete and definitive...

against a schematic, geometric ground: a free association that may have harked back to Leger's later compositional ploys...

state of affairs. But the signs are that Phillips at last chose to move out of the corner he was in... That early work had none of this division to it, and now the latest work begins to bear certain decided similarities to it, all most encouraging.

Phillips' continuing uncertainty is still evinced by the violation of the picture surface in his most recent work of all, bringing the elements in his compositions forward of the picture plane into actual space...



Mike Grady and Gay Hamilton

Beyond Therapy/Latchmere Rosalind Carne

Lonely hearts and randy psychiatrists are guaranteed to produce at least a couple of self-conscious titers among a London audience. It would certainly be unduly optimistic to hope for anything more from this feeble comedy by Christopher Durang.

The Creation/Elizabeth Hall

The "good week for Haydn-lovers in London" that I foretold on this page last week turned out to have had greater attractions on paper than in its actuality.

The Death of Von Richthofen/Public Theater, New York

Mel Brooks apparently started writing a musical called Springtime for Hitler and turned it into the film The Producers when he realised the musical had no chance of success.

BBC Symphony/Albert Hall

Music gives one the impression of setting up a wide ranging framework and then filling it out rather too tastefully.

London Contemporary Dance Theatre at Sadler's Wells

London Contemporary Dance Theatre will open its three week season at Sadler's Wells Theatre with two works by American choreographers: Explained by Paul Taylor and The Broad by Richard Kuch.

A scene from 'The Death of Von Richthofen as Witnessed from Earth'

Douglas W. Schmidt's set gives realistic dimensions to the spindly of a front-line bunker along with the painted ceilings in the French chateau.

Pina Bausch's first London season

Pina Bausch's Tanztheater from Wuppertal will present two productions at Sadler's Wells between September 14 and 25.

THEATRES

- ALBANY, Air-cond. 5.836 3878. CC 830...
ALDWYCH, R.D. 01-836 6404. Reduced Group rate 01-378 8061. Preview 7.30. Sat 8.00. Sun 8.30. OPENS THIS WEEK...

- CHICHESTER FESTIVAL THEATRE, 0243 78132. Season sponsored by Martini & Rossi Ltd. GOODBYE MR CHIPPS. Tony Colston.
COMEDY THEATRE, 01-836 2878. Credit card bookings 01-836 3793. Sat 8.15. Mat 7.30. Sun 8.00. (not suitable for children). No part after 10.00. PREVIEW 7.30. Sat 8.00. Sun 8.30. OPENS THIS WEEK...

- HER MAJESTY'S, 01-830 6606-7. Credit card bookings 01-830 6608. Sat 8.15. Mat 7.30. Sun 8.00. (not suitable for children). No part after 10.00. PREVIEW 7.30. Sat 8.00. Sun 8.30. OPENS THIS WEEK...

- KINGS HEAD, 226 1916. Don 7. Show 8. I'M JUST WALKING ABOUT OSCAR. 3.00. Sat 8.15. Mat 7.30. Sun 8.00. (not suitable for children). No part after 10.00. PREVIEW 7.30. Sat 8.00. Sun 8.30. OPENS THIS WEEK...

- PALACE, 01-837 6824. CC Hotline 437 8327. Credit card bookings 01-837 6826. Sat 8.15. Mat 7.30. Sun 8.00. (not suitable for children). No part after 10.00. PREVIEW 7.30. Sat 8.00. Sun 8.30. OPENS THIS WEEK...

F.T. CROSSWORD PUZZLE No. 4955

- ACROSS
1 Left in carriage and pair (6)
4 Wise step in the present era (5, 3)
9 Ploughed a mowed field (6)
10 I've turned to lemon squash, not a good sign (4, 4)
12 Gambling game permitted in the course of a journey (8)
13 They're made to measure (6)
15 Ping of revolvers? (4)
16 One who feels the heat for one who feels the cold (7)
20 Book covering part of N. Africa (7)
21 Labour staged a walk-out? (4)
25 Not many people with a dog will keep one indoors (8)
26 It may be put on disc (8)
28 Without it there would be total ignorance (8)
29 Chews a sort of nut (6)
30 A group of society women (8)
31 Got up smartly (6)

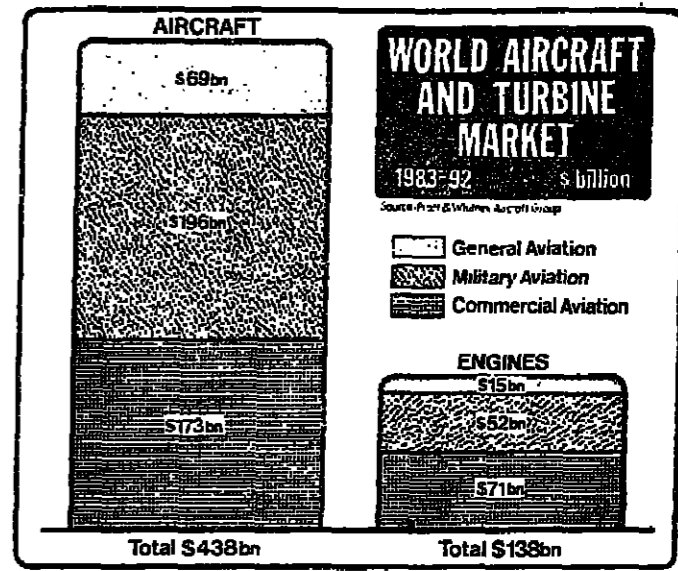
Crossword puzzle grid with numbered squares and clues.



An artist's impression of how the civil version of the projected new joint Anglo-Italian (Westland and Agusta) EH-101 heavy helicopter will look. The aircraft is being designed and built as a military replacement for the Sea King anti-submarine warfare helicopter, but the commercial version will be built alongside it to spread the costs and widen the ultimate market.

Aerospace

Western world aerospace activity has suffered from the recession, especially on the civil side. The outlook, however, is for over \$600bn of business through the next decade for commercial and military aircraft and engines, missiles, spacecraft, avionics and equipment of all kinds



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● Editorial production in this survey is by Mike Wiltshire and Joe Hutton.

Industry resilient despite setbacks

By MICHAEL DONNE
Aerospace Correspondent

THE WESTERN world's aerospace industries go to this year's Farnborough Air Show (September 5-12) confident that despite the severe ravages of the recession, especially in the civil market, the longer term outlook for their products remains good provided they can survive their current problems.

The array of civil and military aircraft, engines, guided weapons and electronics and other equipment of all kinds that will be on display at Farnborough will indicate an industry that is resilient, innovative and forward-looking despite the serious setbacks of the past two to three years as a result of world economic difficulties.

The latter have been most severe on the civil side of the industry. The heavy losses incurred by the world's airlines as a result of the decline in air travel and soaring costs have in turn led to a marked fall in the inflow of new orders and in some cases even to cancellations or deferrals of orders for new-generation equipment placed as recently as two to three years ago.

One immediate result of this has been that most commercial aircraft and engine manufacturers have been obliged to run down their production rates

national, as opposed to nuclear, weapons in the Western Alliance and a continued high level of interest in military aircraft and their associated weapons and equipment in the countries of the Third World are both tending to ensure a steady inflow of new military aircraft orders, although competition is exceptionally fierce.

New military aircraft programmes now coming to fruition include the 400 aircraft in the AV-8B Harrier II programme for the U.S. Marine Corps (336) and the RAF (60) with four development aircraft; the new JAS multi-role combat aircraft for the Swedish Air Force; the B-1B strategic bomber in the U.S.; and the "next generation trainer" for the U.S. Air Force, recently won by Fairchild and Garrett in the U.S.

On the way are such prospective new ventures as the P-110 fighter in the UK, which may well become a collaborative venture with West Germany and Italy; the Anglo-Italian EH-101 helicopter; a new trainer for the U.S. Navy; the British Aerospace Hawk now the most likely ultimate winner; and in the longer term the likelihood of some kind of supersonic vertical take-off fighter for the mid to late-1990s.

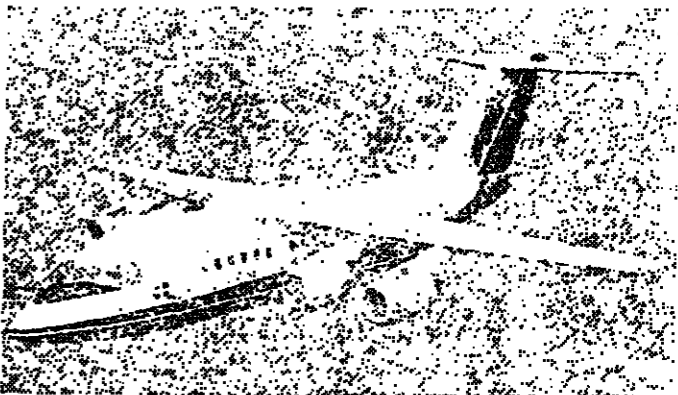
New engines, such as the development of the Turbo-Union RB-199 for the P-110 fighter, and perhaps also a Viper engine replacement; major new missile programmes, such as the British Aerospace Sea Eagle long-range air-to-surface anti-ship missile, and the Advanced Short Range Air to Air Missile (ASRAAM) are on the way.

business in spacecraft of all kinds, but particularly in the manufacture of communications satellites of which large numbers are expected to be needed throughout the rest of this century.

On the civil side the task for the manufacturers is now more one of survival, working through the accumulated backlogs of orders for the new generation of airliners, while waiting for the economic upturn it is hoped will result in increased air travel and a revival of demand for aircraft.

Even on the depressed civil side, however, there is still considerable long-term optimism. Apart from the new generation of airliners already in production, such as the Boeing 757 short-to-medium range and 767 medium-to-long range airliners, and the rival Airbus Industrie A-300 and A-310 in Europe, together with the smaller (but nonetheless significant) British Aerospace 146 four-engine regional airliner, there are many ideas for the future.

These include plans for eventual derivatives of all of these and other existing aircraft types to fill a wide range of payload requirements. But the most immediately significant venture is the projected 150-seater short-to-medium range airliner, on which several airframe and engine manufacturers in both Europe and the U.S.—and indeed in other parts of the world including Canada, Australia and Japan—are now focusing much attention.



The British Aerospace BAe 146 four-engine regional airliner is now undergoing its flight test programme. The aircraft, which involves an investment of over £350m by British Aerospace, is being built in two versions—the Series 100, carrying about 80 passengers, and the larger Series 200, carrying up to 109. The test programme is aimed at winning a Certificate of Airworthiness by the end of this year, clearing the way for deliveries to customers in early 1983.

substantially better times over the next decade despite today's difficulties.

Boeing, for example, the biggest jet airliner builder in the world, still believes that there will be a demand for something around \$126bn of new jet airliners between now and 1992, covering just over 4,000 aircraft.

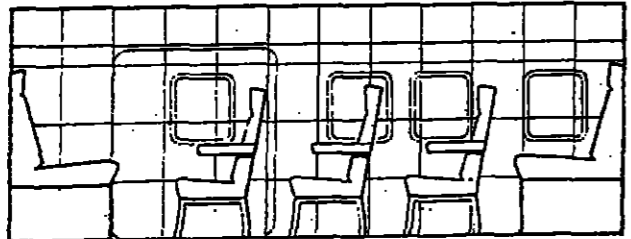
Pratt and Whitney, the world's largest aero-engine manufacturer, is also optimistic. This company forecasts a total civil and military aircraft and engine market between 1983 and 1992 of about \$438bn (in 1982-83 dollars).

Of this, about \$173bn will be for some 4,050 commercial airliners, creating a demand for some 12,000 turbine engines, worth about \$71bn.

In the military market there forecasts continue to predict

When we designed the new Westland 30, we wanted to build a helicopter that was so versatile it would meet your needs, whatever field you're working in.

We succeeded. The secret of our success is the 460 cu. ft. of space inside. Because it gives you the freedom to choose from a wide variety of cabin layouts.



Suppose, for instance, that like British Airways Helicopters, you wanted to carry commuters on a scheduled passenger service.

All we would need to do is to fit the Westland 30 with our standard seating plan. That way you could carry seventeen people in armchair comfort.

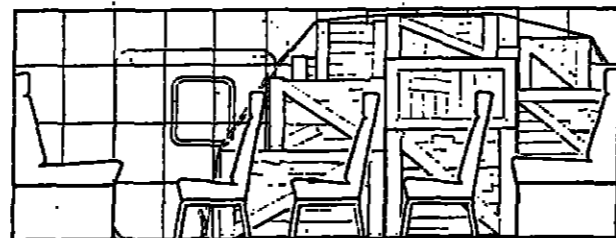
There's so much room, they can even stand up and move around.

And that's a rare luxury in a helicopter. We have also built 74 cu. ft. of luggage space into the back, so they won't keep tripping over their cases. In fact, they'll feel so comfortable they could be forgiven for thinking they were travelling in a 737.

That takes care of commuter transport. But what about offshore support?

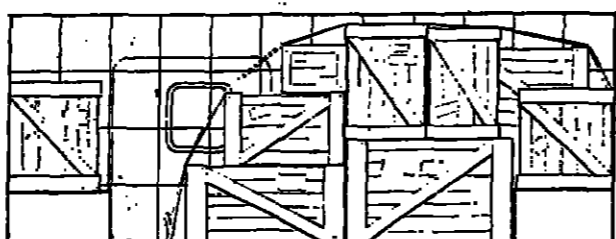
After all, you might well need to ferry oilmen to and fro over the North Sea.

In which case, we can offer you a variety of options.



One of the strengths of the Westland 30 is its rapid turn-round facility. That is to say you can detach the seats and fill the cabin with anything from frozen peas to spare parts.

All in the space of five minutes. No other medium-capacity helicopter can give you such flexibility.



If, on the other hand, you're operating freight services, you will find the new Westland 30 takes a good deal of weight off your shoulders.

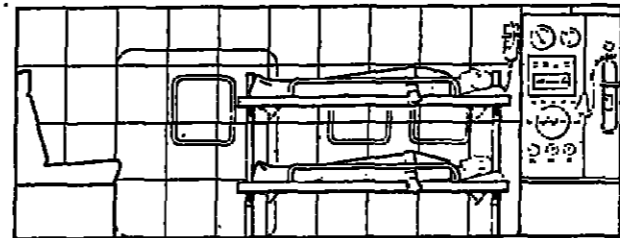
Using the series of anchor-points in the floor, you can secure and transport almost any kind of cargo.

Running an emergency service like the Red Cross is a different matter. Say, for example, you wanted to fly earthquake victims from the scene of a disaster to a medical centre.

There too, the Westland 30's

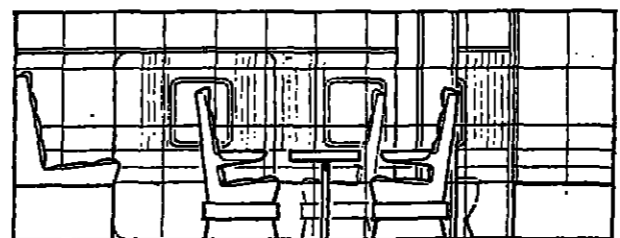
spacious cabin will come to your rescue.

It holds 6 standard hospital stretcher cases and up to 8 seated casualties with no trouble at all.



And it's so tough and adaptable inside it can work equally effectively for police, fire and ambulance services.

But the priorities would differ again with a multi-national company like Ford.



It might then be a question of rushing top executives to meetings in places like

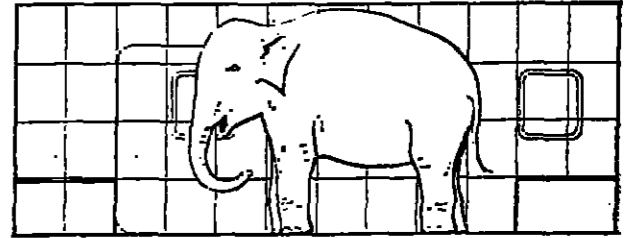
London, Paris and Brussels in the style they're accustomed to.

We've already catered for that. We've designed a luxurious VIP cabin layout for six to ten people.

It can come complete with a galley, a toilet, communication systems and air-conditioning.

There are optional extras such as a cocktail cabinet and swivel armchairs.

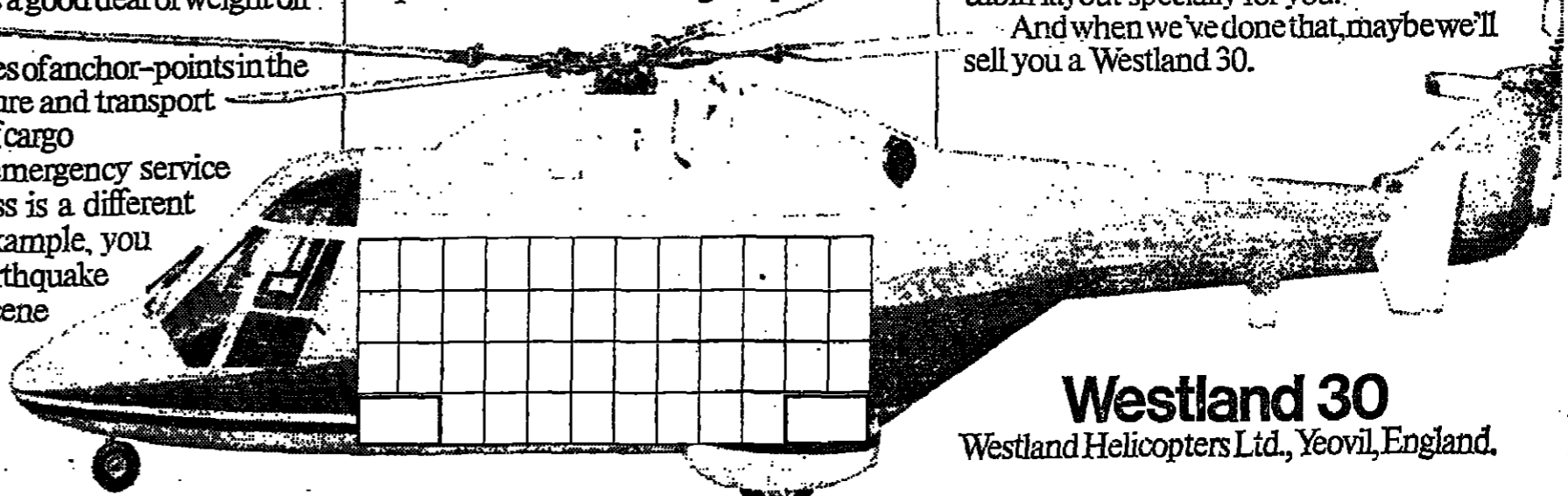
We can even fit a separate private compartment, should you require it.



Of course, you may have very different ideas about what you want to use the Westland 30 for.

If so, why not get in touch with us? We'll be only too happy to design a cabin layout specially for you.

And when we've done that, maybe we'll sell you a Westland 30.



Westland 30
Westland Helicopters Ltd., Yeovil, England.

WE WON'T SELL YOU A WESTLAND 30 UNTIL YOU TELL US WHAT TO DO WITH IT.

AEROSPACE II

Aircraft builders, engine makers and equipment suppliers have a common goal—to survive the worst recession in the industry's history. Articles on this and the following two pages review the extent of their current troubles and their prospects once the hoped-for world economic recovery begins to take off

Confidence in long-term outlook unshaken

ALTHOUGH THE world's major commercial aircraft manufacturers are now passing through their worst-ever period for the inflow of new orders, and are rapidly working through the backlogs they had accumulated prior to the airline recession, they remain confident that in the long-term, the outlook for new airliner sales remains good.

At present, however, their primary objective is to survive the deprivations of the recession, which has severely eroded world air travel, driven many airlines into severe financial losses, and effectively discouraged them from placing orders for new equipment.

The extent of the decline can be gauged from the fact that during the first six months of this year, the world's biggest jet airliner builder, Boeing of the U.S., received new orders for only 33 jet airliners, compared with orders for 132 aircraft placed in the first six months of 1981.

For other manufacturers, such as Lockheed, the situation was much worse and, indeed, Lockheed has decided to pull out of the big commercial air-

liner market by 1984, although it will remain a major builder of military transport aircraft, and even retains an interest in possible future new civil airliner developments.

For McDonnell Douglas, it is only the advent of orders for the KC-10 tanker-transport version of the DC-10 from the U.S. Air Force that is keeping the DC-10 airliner production line running, otherwise with the current paucity of new orders even that company might have been obliged to reconsider its wide-bodied jet production plans.

But Airbus Industrie, the West European airliner manufacturing group (in which British Aerospace has a 20 per cent stake), is currently increasing its production rate of A-300 and A-310 Airbuses— from the present 4.5 a month to reach eight a month by 1984, to meet existing contractual commitments.

With an order book for 506 aircraft (323 250-seat A-300s and 183 of the smaller 200-seat A-310s) Airbus has cut a swathe through world markets in recent years, capturing many orders that its arch-rival, Boeing, thought it would win.

Many of these orders have come from the Third World, where Airbus has put considerable efforts into its sales campaigns, and where air transport as a whole has been less affected by the recession. Production of the Airbus could go to ten aircraft a month beyond 1984, if demand justifies, but since Airbus Industrie itself has experienced a marked slowing down in new orders in recent months, it seems unlikely that at this stage production will be pushed up to that level.

Fuel prices may have stabilised in recent months, or even come down a little, but it is accepted that the long-term trend must still be upwards, generating before the end of this decade a requirement for increasingly fuel-efficient aircraft.

Because of the rising costs in other directions (labour, landing fees, navigation charges and ground handling), there will continue to be a need for improved aerodynamic efficiency, with reduced weight through the use of new materials, to keep down aircraft direct operating costs, again

stimulating a demand for the new generation of jets that embody these features.

The need for much less noise will also remain a major factor in airline planning, generating the demand for the new generation of quieter engines.

All these factors add up to the belief, shared by most of the manufacturers, that the long-term outlook remains good, despite the current gloom. Boeing, for example, still believes that up to 1993 there will be a market for about \$126bn of new jets.

This will cover some 4,000 aircraft of various kinds, of which Boeing believes that not less than 1,100 will occur in the short-to-medium range wide-bodied or semi-wide-bodied market (for aircraft like its own 767), and at least another 1,350 in the smaller short-to-medium range narrow-bodied market (for aircraft like its new 757).

More detailed forecasts prepared by Pratt and Whitney Aircraft Group, the biggest aero-engine builder in the world (part of the United Technologies Group), suggests that the market for commercial air-

liners could be worth about \$173bn by 1992, or about 4,030 aircraft. Pratt and Whitney further breaks this figure down into 570 long-range twin-aisle airliners (like the 747) worth about \$48bn; 1,310 medium-to-short range twin-aisle jets (like the 767) worth about \$82bn; and 3,170 medium-to-short range single-aisle aircraft (like the 737), worth about \$63bn.

Most manufacturers believe that the recovery will come sometime between 1983 and 1985. In the meantime, the orders emerging are small, and are mainly coming from those airlines whose markets have not suffered so severely from the recession, such as those in the Third World, or countries whose air transport industry is being deliberately developed as an instrument of social and economic expansion.

In other parts of the world, including the U.S. itself, the manufacturers have been facing the reverse trend of airlines seeking either to defer the delivery of new jets or to cancel orders outright.

Boeing in particular has suffered this problem (which is perhaps one of the penalties

THE COMMERCIAL AIRCRAFT MARKET

\$173bn in aircraft sales are likely during the next ten years

Aircraft market estimates 1982-92, in 1982 \$bn

Aircraft	U.S. Units	Non-U.S. Units	World Units
Long range	70	6	76
Medium/short range over 200 passengers	520	24	544
Medium/short range under 200 passengers	950	28	978
Total deliveries	1,540	58	1,598

Turbine engine market estimates, 1982-92 in 1982 \$bn

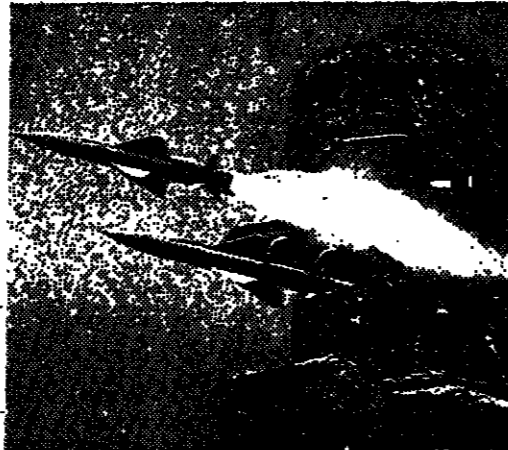
Engine thrust class (000 lbs)	U.S. Units	Non-U.S. Units	Total Units	Total \$
Over 40	1,700	14	1,714	6,000.46
25-40	2,000	2	2,002	4,600.17
8-25	800	3	803	1,400.8
Total	4,500	28	4,528	12,000.71

Source: Pratt and Whitney Aircraft Group, U.S.

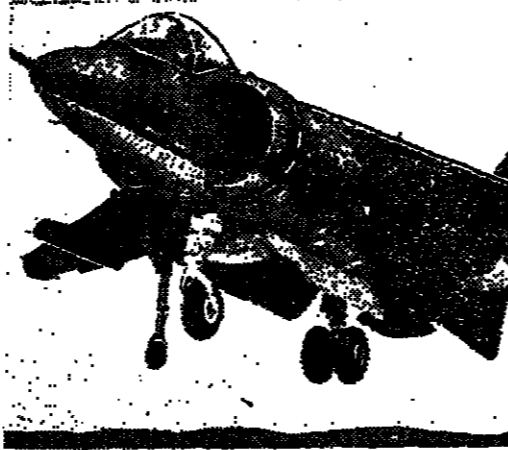
BAe 146 fanjet-powered feederliner



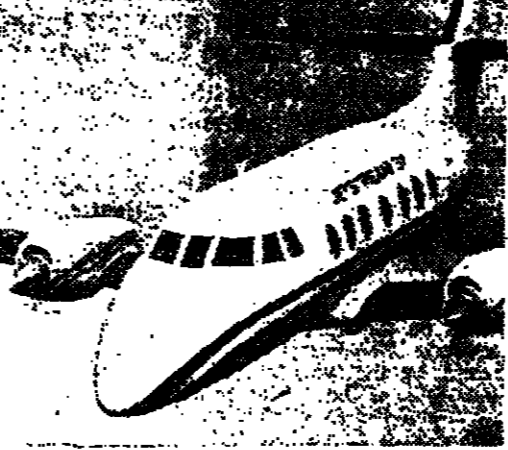
Rapier ultra-low-level anti-aircraft missile



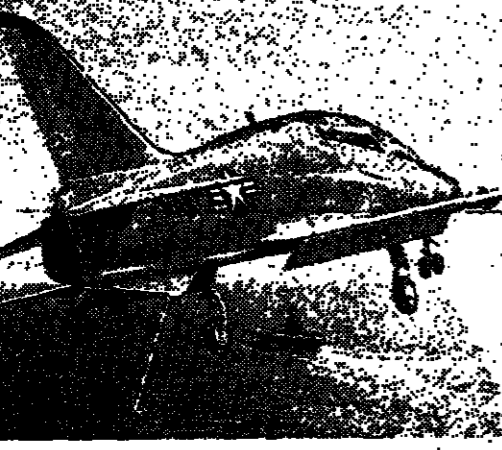
Harrier V/STOL combat aircraft



Jetstream 31 commuter and corporate airliner



Hawk advanced naval trainer



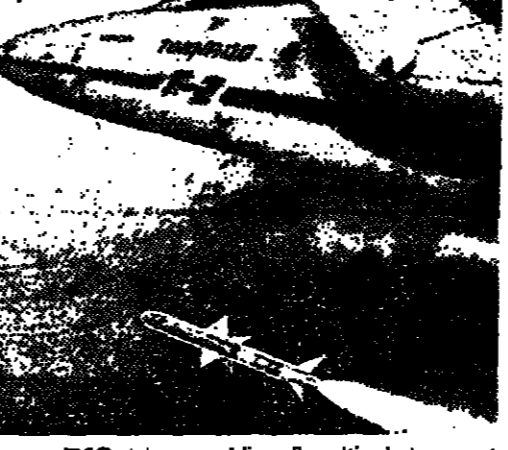
Jaguar tactical strike aircraft



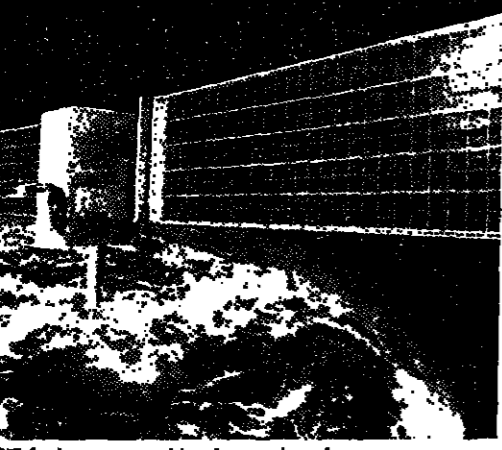
Nimrod AEW Mk 3 airborne early warning aircraft



Sky Flash medium-range air-to-air missile



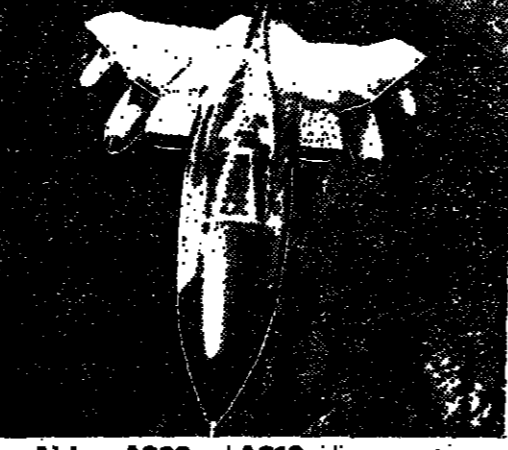
Communications satellites - L-Sat multi-role comsat



Seawolf close-range ship-defence missile



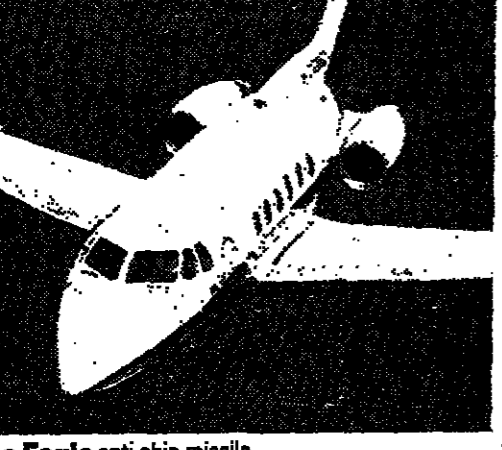
Tornado all-weather combat aircraft



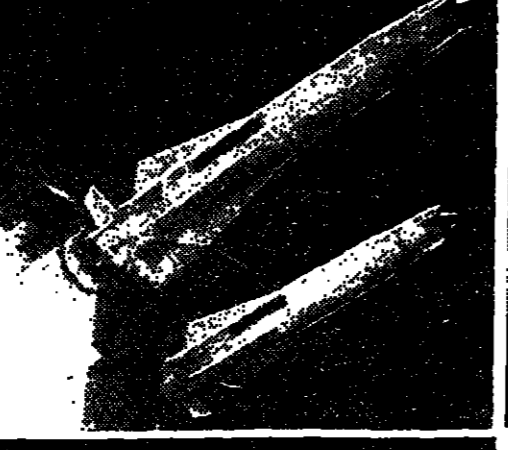
748 turboprop airliner & multi-role transport



125 fanjet-powered business aircraft



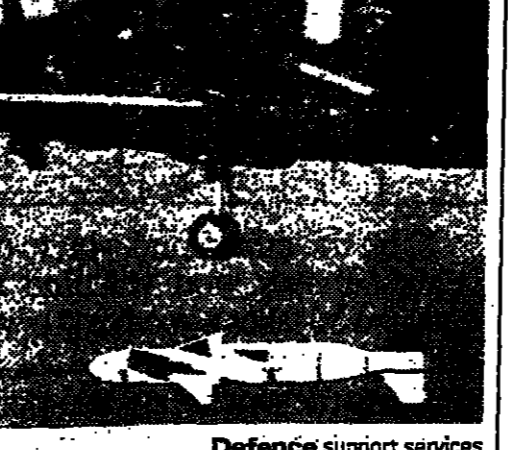
Sea Dart medium-range ship-defence missile



Airbus A300 and A310 airliner programmes



Sea Skua helicopter-launched anti-ship missile



Sea Eagle anti-ship missile



VC10 air-to-air refuelling tanker



Defence support services



BRITISH AEROSPACE

PLC, Weybridge, England

of being the biggest jet builder in the world), and this is putting a squeeze on its finances. The other hand, the main engine manufacturers—Rolls-Royce, Pratt and Whitney, the three Japanese engine companies, MTU of West Germany and Fiat Aviazione of Italy—are all also discussing possible collaboration on a single engine for the projected aircraft.

But all are agreed that the timing of such a venture has been pushed back. At one stage, 1986 had been canvassed as a possible in-service date, but this has now moved back to late 1987 or even 1988, as a result of the recession, and it is possible that it may be pushed back even further to 1989 or even 1990. At this stage, however, 1987 appears to be the target at which most manufacturers are aiming, and some decisions on who is likely to build what may well emerge by about the end of this year.

But the cost of such an aircraft will be heavy—amounting to about \$2bn for the airframe and another \$1.5bn for the engine. It is this which is dictating the international collaboration that is causing so much discussion—encouraged, especially in Western Europe, by governments who know that sooner or later they are going to be asked to help finance such a venture through launching aid.

Michael Domie

Resilient industry

CONTINUED FROM PREVIOUS PAGE

sering total of \$538bn. If further to these figures is added the \$75bn to \$125bn that it is estimated the U.S. alone will spend over the next decade on strategic missile systems (much of which work will be conducted by the aerospace industry), and the growing volume of space activities, the overall volume of available Western world aerospace business rises to well over \$600bn.

Much of this money will of course be spent inside the U.S., by the U.S. armed forces, for their own re-equipment. But there will still be enough left over for the rest of the Western world's aerospace industries to pick up a good living, provided they remain lean, tough and competitive.

Estimates for aerospace production, both by size and value, of the Soviet Union and its allies, over the coming decade are unobtainable but are anyway largely academic (beyond demonstrating the size of the Soviet industry) simply because that country imports very little in aerospace hardware, apart from its continuing interest in high-thrust turbo-fan engines and in items of advanced high-technology aeronautical equipment.

Whether these estimates of Western aerospace business will be precisely achieved remains to be seen. But it is clear that most manufacturers are not only looking for such an improvement over the next decade but are actively preparing to meet it—and even, where it is within their power, to make it possible.

They are supported in their belief by the fact that despite the recession many of the underlying factors that even as recently as two to three years ago were generating a new demand for commercial aircraft have not changed—the increasing age of much of the present equipment used by the world's scheduled airlines, the need for ever-improving fuel efficiency through engine and aerodynamic improvements and the need for reduced noise.

On the military side, despite pressures for disarmament and budgetary constraints in some countries, the overall trend in military aircraft procurement remains upwards and seems likely to continue that way for the foreseeable future.

But the pattern of the industry has been changing significantly and this is likely to be seen at Farnborough more so than ever before, in the plethora of international collaborative arrangements either already under way or planned for the future.

International collaboration is not new, especially in Western Europe. But the most significant change is that it is now spreading much more rapidly to the U.S., where there has been an upsurge of interest in international ventures.

This has already become apparent in the collaboration between Boeing, Italy and

Japan on the 767 airliner and now also in the search for collaborative partners by both Boeing and McDonnell Douglas (as well as Airbus Industrie in Europe) for the projected 150-seater airliner.

It is also manifesting itself in the helicopter field, with Sikorsky expressing strong interest in international ventures, covering both current and future models; in the military field with the U.S. Marine Corps procurement of the AV-8B Harrier jointly developed by McDonnell Douglas and British Aerospace; in the U.S. Navy's interest in the British Aerospace Hawk; also involving collaboration with McDonnell Douglas for its next-generation trainer programme; and in the talks between Rolls-Royce, Pratt and Whitney, Japan, and others on a new engine for the 150-seater airliner.

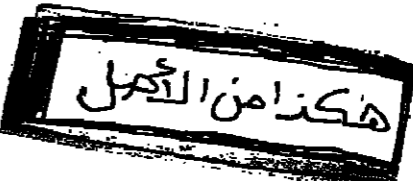
Yet another significant trend is towards greater use of derivative aircraft and engine rather than involvement in the very heavy costs of developing entirely new ventures. While the latter may from time to time become necessary, where major advances in technology are required, the tendency now is consistently to update what is already available. This is true both of civil and military aircraft and engines.

In the civil field, in view of the parlous financial condition of the airlines and the very heavy costs of developing new airliners and engines, it seems likely that most of the new on offer will remain the basic types through to the end of this century, being either stretched or modified in other ways to meet the changing range and payload requirements of the airlines as well as the demands for ever better fuel consumption for ever better economy.

It seems likely that only one major new airliner will emerge in the foreseeable future—the much-vaunted 150-seater and its associated engine.

The market for such an aircraft (about 1,000 units or more over the next decade) is so great, with no other existing aircraft filling the gap, that a new aircraft is really required. But once it is developed the entire range and payload spectrum will virtually be filled, with only a few exceptions of comparatively limited market potential—and even these are likely to be met by variants of existing models.

It is this likelihood that the 150-seater will be the last major new civil airliner this century that is generating the current search for new international partners, with the possibility of new international consortia emerging before very long. Just who will link with whom in this international dance remains to be seen but whatever groups emerge are likely to remain together for the rest of this century; if not for longer, with a consequential far-reaching influence on the shape and scope of the world aerospace industry.



Like most wars, on whatever scale, the Falklands conflict provided a practical testing ground for much military technology still in the development stage. Our Science Editor, David Fishlock, here describes some of the valuable information flowing back to Britain's Royal Aircraft Establishment at Farnborough

Research centre grapples with testing demand

THE Royal Aircraft Establishment, Farnborough, host to the Air Show, is Britain's biggest defence research and development centre and the linchpin in the system of technical advice supporting the Ministry of Defence's £2.6bn procurement programme for air equipment in 1982-83. It also supports Britain's civil aerospace activities, from new airliners to satellite systems such as UK participation in the European Space Agency's planned earth resources satellite, ERS-1.

The air systems establishment has experienced two traumatic developments since the last show. One was the return of Mr Tom Kerr for his third tour of duty, this time as director, with a mission to implement

major changes required both by the Strathcona report on defence R and D, and by the changing perceptions of weapons R and D. The other was the Falklands war, in which numerous RAE developments nearing completion found themselves abruptly tested in battle.

Tom Kerr, 58, is a physicist and former RAF fighter pilot and flying instructor whose previous experience at Farnborough includes leading the supersonic flight testing programme in the 1950s and as head of the research group in weapons department in 1970. Before his latest return he was director of the National Gas Turbine Establishment, Fyestock.

Mr Kerr's new job included

cutting the RAE's payroll by 25 per cent over four years and, simultaneously, adapting the establishment to a major R and D policy change, putting less emphasis on aircraft themselves and more on weapons and their delivery systems.

The Strathcona report called for much project work as well as laboratory services provided by the defence R and D establishments to be done instead by industry under contract. Air equipment R and D was less vulnerable to this instruction than army and navy equipment R and D, where traditionally more design and project work had been done in-house. Nevertheless, for the RAE it will mean some changes.

For example, there is the possibility of opening up the Farnborough airfield to business aviation but with the Establishment continuing to control and operate it for experimental flying.

The more positive side of Strathcona includes the strengthening of long-term basic research. So far Kerr has raised it by 2.5 per cent of his budget and hopes to double the proportion this year so as to achieve the recommended 5 per cent level.

To meet demands for staff economies two RAE departments—engineering physics and flight structures—have been abandoned. Work has either been picked up by industry or transferred to other departments. Flight systems, for example, has taken responsibility for the complete cockpit structure, human factors and survival systems, in a major UK effort to redesign the cockpit.

Kerr has also created three new divisions. One, in the flight systems department, will focus on the rapidly developing technologies of flight computers. Another is an unmanned aircraft division, emphasising the growing potential of the remote pilotless vehicle (RPV). A third is a systems analysis division, reflecting his experiences of the value of simulating war scenarios at the Defence Operational Analysis Establishment in the 1960s.

Not yet resolved is the future of the National Gas Turbine Establishment near Farnborough. Strathcona recommended a special study of the future of this laboratory and whether, for example, its programme could satisfactorily be divided between RAE and Rolls-Royce. About one-third of the NGTE's work is on civil aircraft engines. Of future military aircraft concepts such as the P110 fighter and the super-sonic jumpjet, RAE and NGTE already work in close partnership. A merger between RAE and the NGTE is an obvious possibility.

"My job is totally different from that of Farnborough's director 10-15 years ago," Mr Kerr acknowledges. But it still leaves him time to get immersed in the science and technology of aerospace, while on the weapons side he is increasing, not reducing, the establishment's efforts.

One major change on the civil side which has given him some extra manpower is the closure last spring of the thermal testing of a Concorde programme which involved about 66 people. Cold testing continues for several years yet, however, to complete the data needed for Concorde to continue in service to the end of the century.

The other recent development, the Falklands war, drained the laboratories of much of their most advanced technology as the special demands of the engagement

became clear. Often the services learned how to use the new technology while journeying to the Falklands.

During the engagement the RAE carried out about 90 trials on its ranges in direct response to such requests as how ships could decoy the air-launched Exocet missile. It was an extremely stimulating time for the establishment—"people had the most innovative ideas," Mr Kerr says.

Wind-tunnels

Tasks thrust upon Farnborough as a result of the engagement ranged from new combinations of aircraft and weapons—Harriers armed with the Sidewinder missiles, for instance—to the use of its wind-tunnels to explore ways of putting up tents in high winds.

The establishment's capability for night vision was in urgent demand in a war which was being fought round the clock; traditionally night has meant a respite in fighting. New navigation and radio fix systems were rushed from the laboratories to equip the Vulcans and Nimrods for in-flight refuelling in total darkness. The Harriers and helicopters were hastily fitted with the latest technology for night vision.

"The rate at which we introduced modern systems at the start of the Falklands crisis is incredible," Mr Kerr claims. Some of the new systems will be making their public debut at the Air Show. Farnborough itself will be demonstrating its REDOWL (Remote Eyes in the Dark Operating Without Light) system of night vision for helicopter pilots as part of a major exhibit of the helicopter as a weapons system. REDOWL allows the pilot to fly very low and to undertake search and rescue operations at light levels lower than clear starlight. Ferranti developed the technology in collaboration with the RAE's flight systems department.

REDOWL's display is mounted on the helmet of the pilot and served by a low-light-level TV or infra-red sensor set forward on the nose of the helicopter (see accompanying

sketches). The novelty of the RAE's system is in the way this sensor follows the head movement of the pilot, providing him with an interrupted wide-angle vision of the world outside. He can even effectively see "through the floor," for his field of vision extends 100 degrees to the left and right of centre, and from +20 to -100 degrees in the vertical plane.

The helmet-mounted display measures pilot head angles in pitch and yaw and feeds the figures to servos in the sensor platform so that it follows the pilot's line-of-sight. At its heart is a very fast-acting servo, found essential in order to avoid the pilot becoming severely disoriented by any lag in the response of his electronic eye in following the direction in which he was actually looking. If they were to retain the pilot's full cooperation the scientists found that the sensor had to swivel at speeds of at least 1,000 degrees per second.

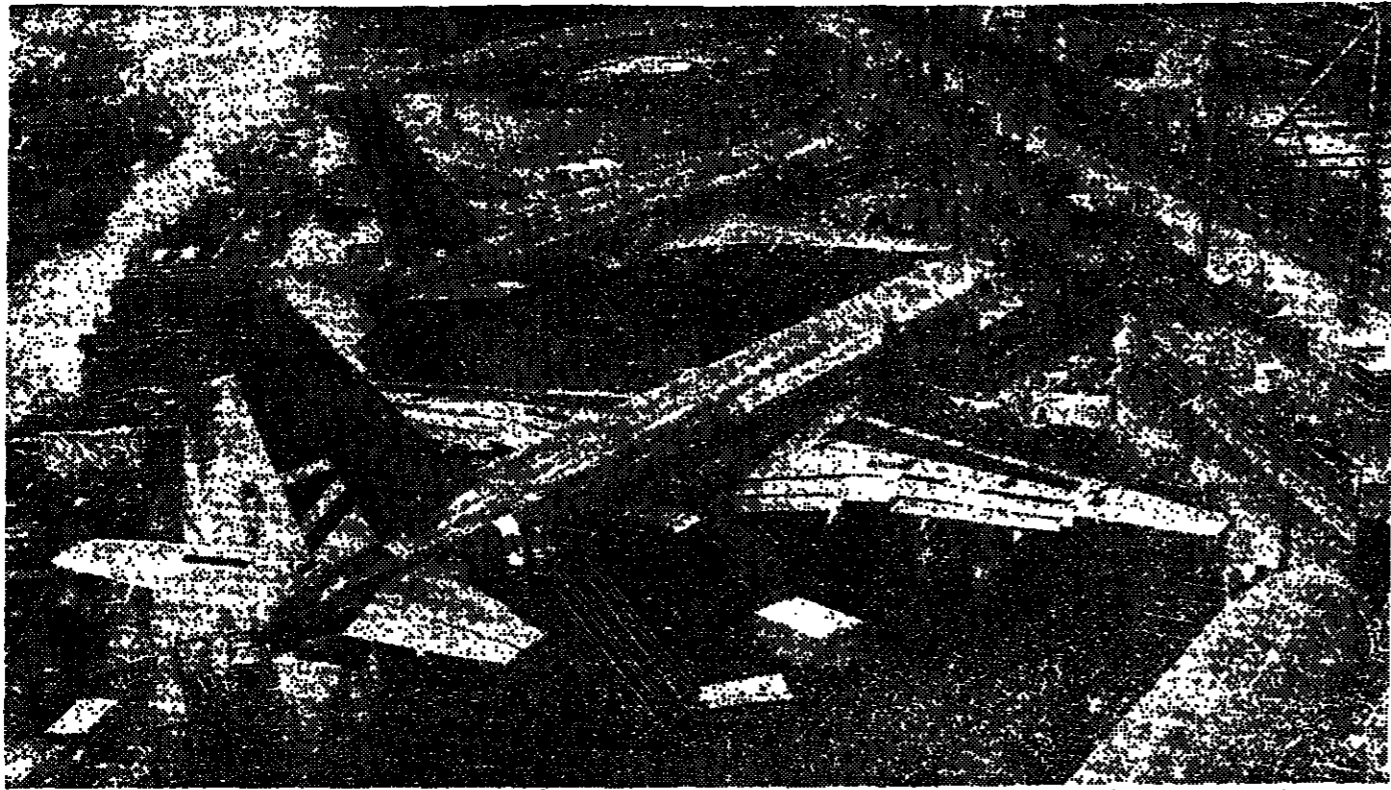
Aerospace enters a new era

THE FINANCIAL TIMES, in conjunction with the Royal Aeronautical Society, is holding the latest in its series of Aerospace Conferences on August 31, and September 1 and 2, at Grosvenor House, Park Lane, London, entitled "Aerospace Enters A New Era."

Designed with the Farnborough Air Show (September 8-12) in mind, the theme of the conference is that, despite the current recession, there is considerable hope for the future. A distinguished international panel of over 30 leaders of the aerospace, civil aviation and related industries will discuss this theme during the three-day event.

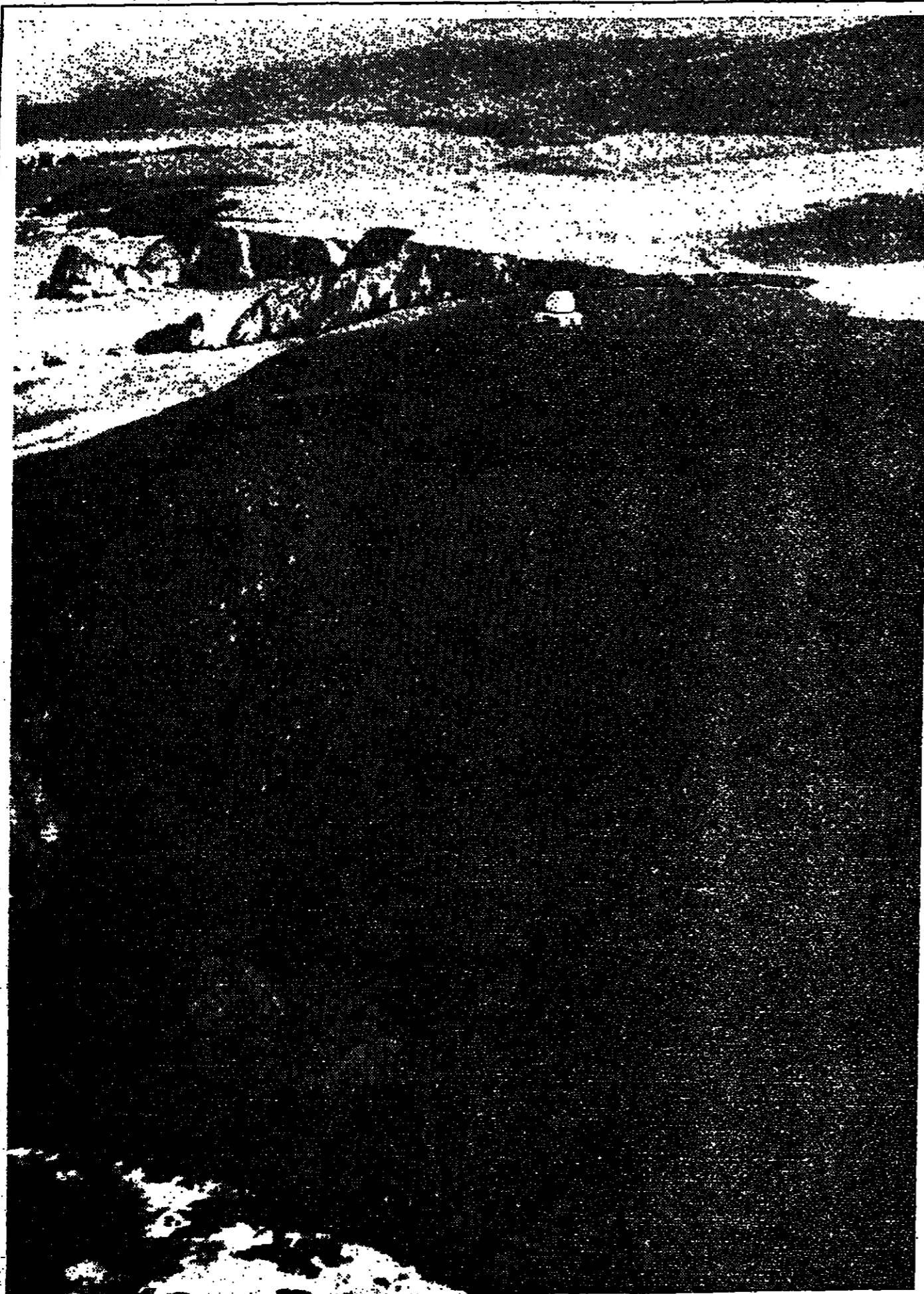
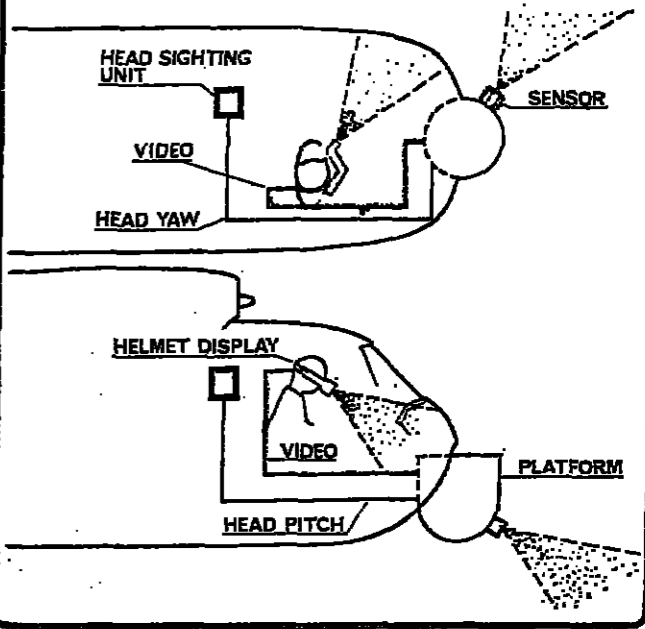


Mr Tom Kerr—back at RAE as head man on his third tour of duty



The first of 17 twin-jet 757s for British Airways (BA) takes final shape at Boeing's Renton, Washington, factory. The new aircraft will join the 757 test fleet later this year for Britain's Civil Aviation Authority certification. UK Government approval is expected in January, when the first BA 757 is scheduled for delivery

Farnborough's REDOWL system for flying helicopters at low level in darkness



New electronic bird watcher scans North Sea air traffic.

Who would expect air traffic to be much of a problem anywhere near this lonely headland in the Shetland Islands, far to the north of Scotland?

The reason is simple. Oil. The Shetlands, once better known for sweaters and sheep-dogs, are just a hop by helicopter from North Sea oil fields. It's not surprising, then, to find a sophisticated radar system in use keeping busy whirlybird air traffic safely under control.

Inside the cocoon-like shelter shown in the photo (left) is the antenna of such a system, designed and built by Cossor Electronics Limited for the U. K. Civil Aviation Authority. At the airport nearby, controllers use Cossor displays to monitor approaching and departing air traffic.

This is just one of hundreds of similar radar systems that Cossor, a Raytheon company, has

supplied for use at airports around the world—and just one part of Raytheon's widespread involvement in air traffic control.

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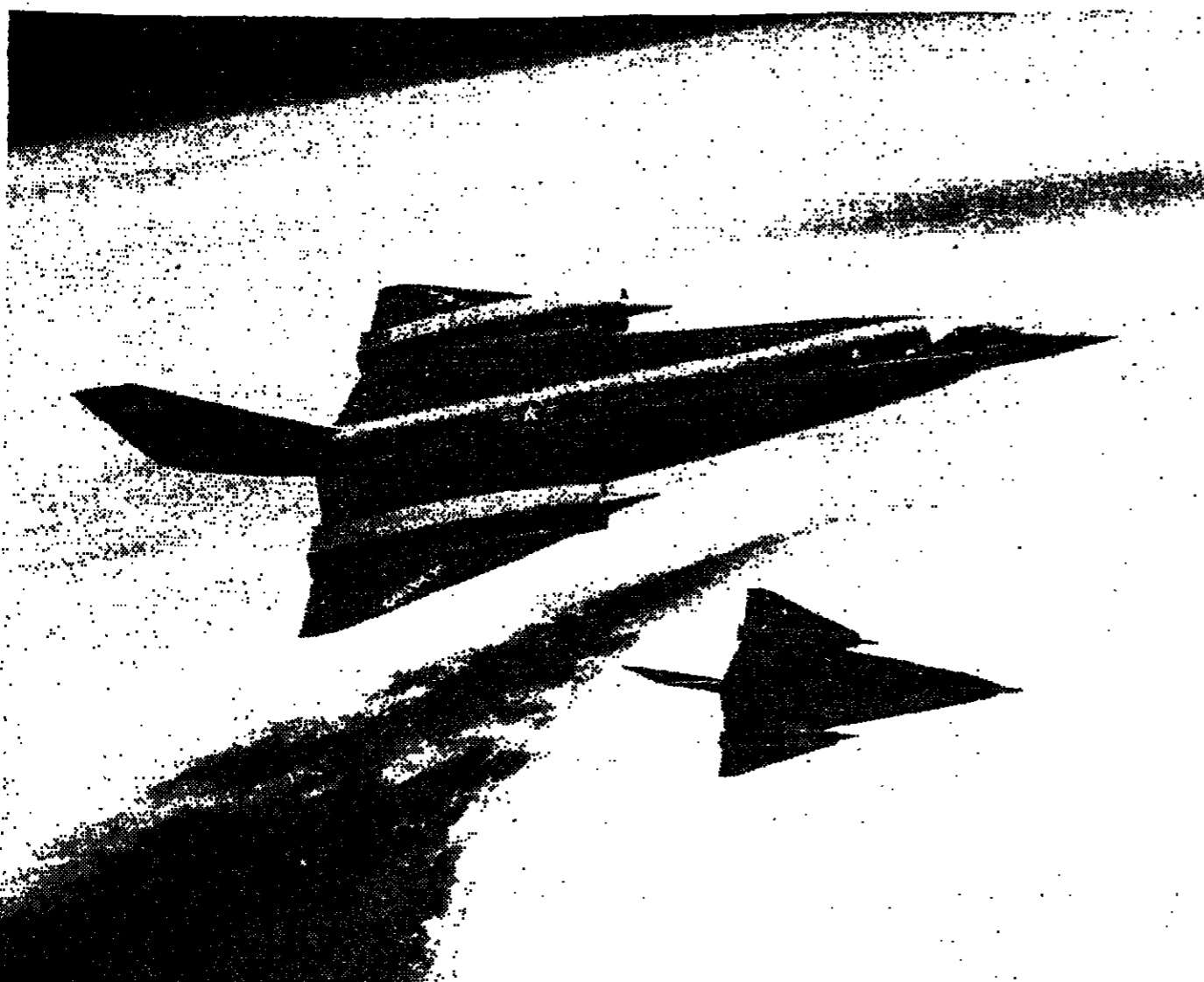
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AEROSPACE VI

Military aviation, including aircraft and missiles, is buoyant worldwide, with many countries, especially in the Third World, building up their air power. This demand will ensure a continued high volume of business for the Western world's aerospace industries for the foreseeable future

Continued strong demand for combat aircraft



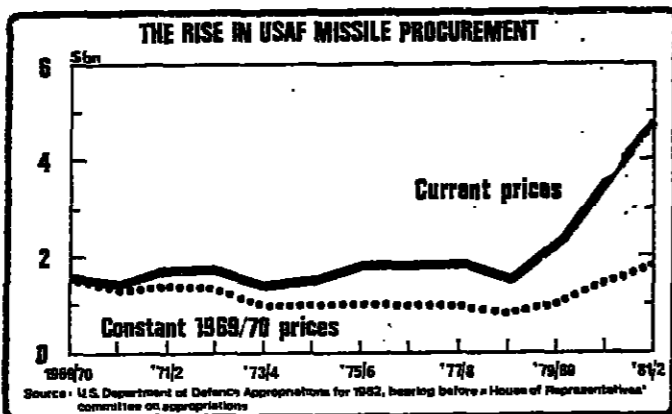
THE possible shape of things to come is illustrated in these conceptions of an Advanced Tactical Fighter under study by the Lockheed-California Company. The fighter's role would be the defence of the continental U.S. against enemy super-sonic bombers but it would also have the capability to perform deep strike and air-to-air missions in any theatre of operations.

and performance, the proposed ATF would use new advanced aluminium alloys that cost less than titanium. These alloys would make feasible the airframe's manufacture under conventional fabricating methods with titanium use limited to areas of the aircraft, such as engine nacelles, subject to extremely high temperatures. Some advanced carbon graphite composites would be employed in the inner parts of the airframe.

As costs continue to rise, more and more care is being spent on perfecting missiles of all kinds to improve the capabilities of aircraft as "weapons platforms"

Guided missiles form spearhead of advanced technology

THE guided weapons sector of the world aerospace industry is set for a period of further rapid growth and unprecedented technical change. The next decade is widely expected by the industry to be marked by multi-billion dollar sales with rising exports and a level of technical advance unthought of five years ago.



These developments are set to place the guided weapons industry in a position of growing importance in the aerospace industry and in component supply industries.

At the same time, military authorities and manufacturers will try to assimilate the lessons of the Falklands war — the first to provide a full-scale test of aggressive and defensive missiles in combat — and look to a future dominated by a new generation of hyper-velocity "thinking" missiles of unprecedented accuracy, with laser and particle beam weapons.

Under the MOU, the European partners and the U.S. will each have the right to produce both missiles, where necessary under licence. Britain is expected to buy the AMRAAM from the U.S. and the U.S. is expected to buy the ASRAAM from Britain and Germany.

MILITARY AIRCRAFT activity, in contrast to the commercial aircraft business, remains buoyant world-wide, despite defence budgetary problems in some countries, and pressures for disarmament in others. Moreover, the overall long-term outlook for the military market remains good, especially with countries in the Third World increasingly interested in building up their armaments inventories.

MILITARY AIRCRAFT. Aircraft market estimates 1983-92. Table with columns for Aircraft type, U.S. market, Non-U.S. market, and U.S. market. Rows include Strategic, Tactical, Transport, Other, and Total market. Includes a sub-table for Turbine engine market estimates 1983-92.

Figures in 1982 dollars.

efforts are being made to keep aircraft in service for longer periods, while spending the available cash on improving the weapons they carry to a much greater extent than hitherto. The aircraft is increasingly being regarded as a "weapons platform," with the development emphasis and budgetary resources concentrated upon making it carry missiles and other weapons loads of greater sophistication and destructive capability.

budgetary constraints in many countries are also influencing the rate at which new military aircraft are being developed. This is especially the case in the Western Alliance where defence budgets are already strained and have to be spread over a wide variety of programmes, with military aircraft having to take their turn in the queue for development cash.

Nevertheless, throughout the U.S. and Western Europe, despite the heavy costs involved, several major new military aircraft programmes are already under way, and new ventures are being planned. The highly successful Harrier is now being developed into the AV-8B Harrier II for both the U.S. Marine Corps and the RAF (which designates it the GR Mark 51, with 336 aircraft to be built for the Marines and 80 for the RAF. This is a joint venture between McDonnell Douglas and British Aerospace.

Through the extensive use of new technology, the JAS will be smaller and lighter than the current Viggen series of fighters it is intended to replace, while offering better performance, including super-sonic speeds at all altitudes.

Biggest share

The biggest share of this market is likely to be accounted for by tactical fighter aircraft of various kinds amounting to about 10,900 aircraft costing some \$124.4bn. The rest will include 100 strategic aircraft (such as long-range bombers) costing about \$17.7bn, 950 transport aircraft costing about \$26.2bn, and 9,250 other types (such as reconnaissance aircraft, trainers, liaison and communications aircraft), costing close to \$28bn.

British Aerospace, also a significant military aircraft manufacturer, forecasts substantial continuing demand, amounting to an average of about \$30bn a year world-wide through to the end of this century.

Whether the French, who also have a new venture of their own, the Avions Marcel Dassault-Breguet ACX experimental fighter (which it is claimed could fly within four years and go into production in the late 1980s) will also join in But at least efforts are being

Strategic

Over the decade to 1992, the U.S. is expected to spend between \$75bn and \$125bn on its strategic missiles. A similar total, between \$75bn and \$100bn is expected to be spent by the U.S. and the rest of the world together on all other types of tactical guided weapons between now and 1992, according to U.S. sources.

Many of these guided weapons have been developed and produced under joint collaborative programmes between companies and between governments.

The aim of this collaboration is to reduce unit costs by sharing research and development expenses and to promote standardisation of equipment among allied forces, including the North Atlantic Treaty Organisation.

Later, Euro-missile Dynamics is also the lead contractor in Britain for the new European advanced short-range air-to-air missile (ASRAAM). This is being developed as a 50:50 joint venture with Bodenseewerk Geratetechnik (BGT), the lead contractor in West Germany.



The British Aerospace Dynamics Group's Rapier missile system which was deployed to such advantage in the Falklands conflict. It is seen here on display at the recent British Army Equipment Exhibition at Aldershot

Michael Donne

Memorandum

The rationalisation is based on a Memorandum of Understanding signed by the three governments. Under the MOU, it is proposed that the development of the next generation of air-to-air missiles should be shared between these members of Nato.

At the same time, advances in microelectronics and composite materials technology will enable BAE to produce the new "hittles" at only a third or a half of the weight of existing Sidewinder-type missiles. Production of the new missiles is expected to start in 1988, with an in-service date of 1987-88.

Lynton McLain

هكذا من الركن

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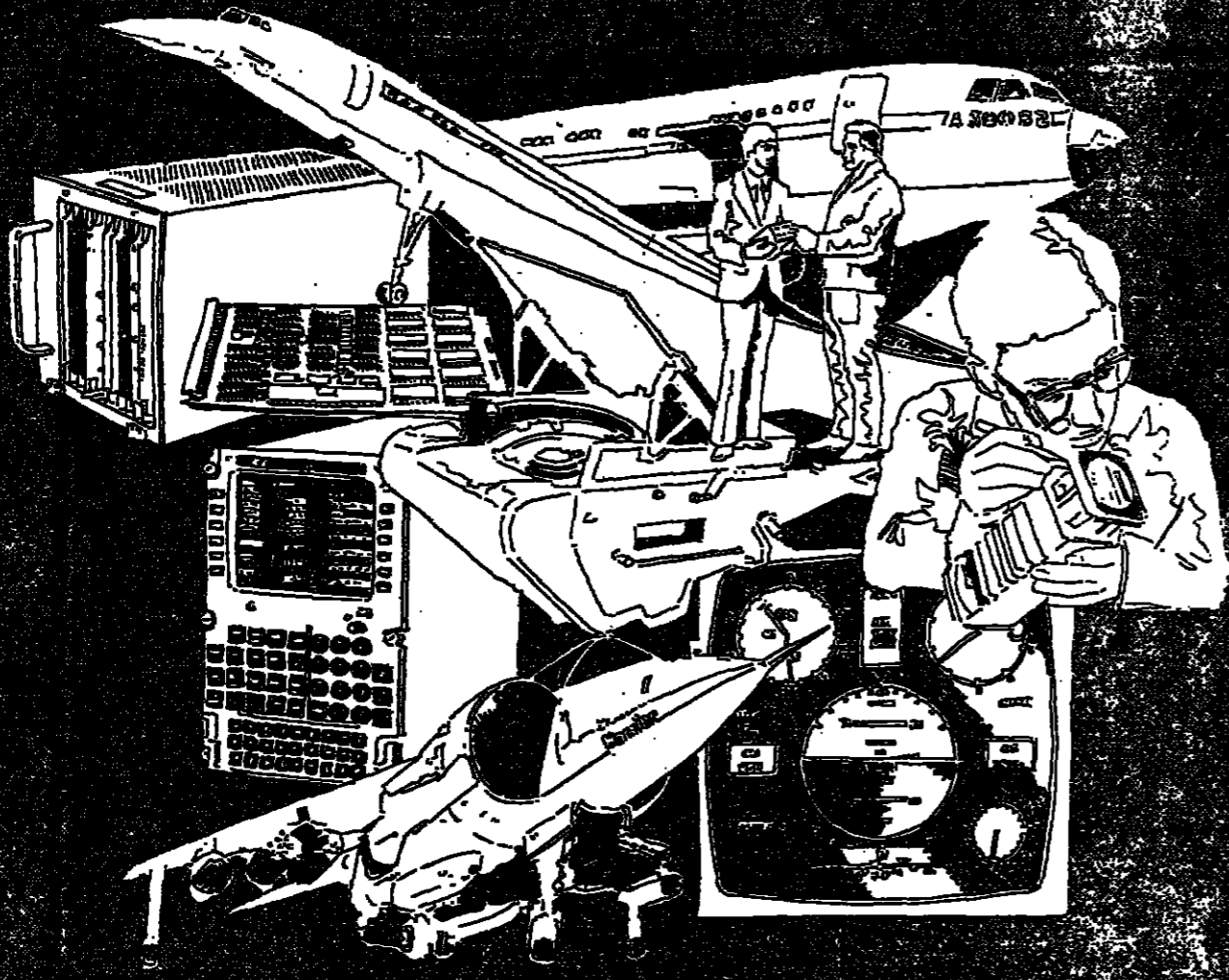
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AEROSPACE VIII

WHY 450 AIRLINES AND AIR FORCES FLY WITH SMITHS INDUSTRIES

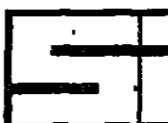


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INDEXES
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With an eventual anticipated development cost of over \$1.5bn (in 1980 dollars) by 1985, when it is likely to be fully functioning as a commercial enterprise, the Space Shuttle is the most ambitious space programme yet undertaken by the U.S., eclipsing in significance even the Manned Lunar Landing Programme of the 1960s in its eventual value in the exploitation of near-Earth space.

President Reagan's Space Policy is aimed not only at making near-Earth Space an open arena for commercial and scientific space activities by all nations, but also to ensure that it is not used for hostile purposes by any nation.

Now, however, Western Europe has rapidly improved its

own space launching capabilities, with the development of the Ariane rocket.

Throughout the rest of this century, apart from some limited launch facilities available elsewhere (such as in Japan), and those provided by the Soviet Union and China for their own programmes (although they may offer facilities to other countries), it seems likely that the Space Shuttle and the Ariane will be competing as the Western world's major launching facilities.

JANE'S

The "new frontier" of near-Earth space is becoming an increasingly significant arena, politically, economically and technologically, promising big business for the world's aerospace industries.

Lively competition in space

Over the remaining years of this century, the major space programmes of the world are likely to be dominated by the proliferation of near-Earth orbiting unmanned satellites, for an ever-widening range of uses, accompanied by a growing volume of manned near-Earth space activities.

While communications will head this list of uses, both for telephone and data transmissions, and also increasingly for video, tele-conferencing and direct broadcasting, many other uses are being and will continue to be found.

Weather forecasting is already well established, but the wide area of Earth resources monitoring is now attracting increasing attention. Activities in this field include seeking new mineral deposits, detecting fish shoals, and monitoring the onset of pests and agricultural diseases in underdeveloped countries, to name but a few.

There are also many direct scientific tasks that both unmanned orbiting spacecraft can perform, particularly to discover more about the near-Earth environment and how to use it more beneficially for mankind as a whole in the future.

Although in the past, most of the demand for satellites has emanated from the U.S., Western Europe, the Soviet Union and Japan, there is now an increasing desire by other countries, especially in the Third World, to possess satellites of their own, primarily for communications purposes.

As a result, it has been estimated that between now and the end of this century, there will be a world-wide demand for between 150 and 200 communications satellites alone, while if to this total is added the satellites for other purposes, the total demand could amount to over 500 spacecraft, creating a multi-billion dollar business (which some have put at over \$60bn) for space hardware alone.

These requirements will also generate a demand for increased launching capabilities. In the Western World, these are already being primarily met by the U.S., with both its Delta and Atlas-Centaur rocket launchers, but now increasingly by the Space Shuttle, or Manned Re-usable Space Transportation System, which is to be the linch-pin around which the new U.S. Civil and Military Space Policy, recently announced by President Reagan, will be built.

With an eventual anticipated development cost of over \$1.5bn (in 1980 dollars) by 1985, when it is likely to be fully functioning as a commercial enterprise, the Space Shuttle is the most ambitious space programme yet undertaken by the U.S., eclipsing in significance even the Manned Lunar Landing Programme of the 1960s in its eventual value in the exploitation of near-Earth space.

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The U.S. Space Shuttle—the manned Re-usable Space Transportation System—will be one of the two means of launching Western World satellites and other spacecraft into orbit through to the end of this century and beyond. The other will be Europe's Ariane unmanned rocket.

The difference between the Space Shuttle and the Ariane is that the former is a manned, re-usable system, whereas the latter is an expendable, un-manned system.

The aim eventually is for the Shuttle to bring down the price of putting payloads into space, but at present, the expense remains very high for both systems.

Nevertheless, the competition is already fierce, and Ariane space has been highly successful in the past year in winning orders from major customers worldwide for satellite launches.

Arianespace aims to capture at least 30 per cent of the Western world satellite launching market in the years ahead.

The cost squeeze imposed on NASA by the U.S. Government, and its own need for cash to fund other space development programmes, including interplanetary probes to distant planets and various scientific missions, have already resulted in a decision to raise Shuttle prices to outside customers, while the original plan to achieve 487 missions over the 12 years to the early 1990s has now been cut back to 312 missions by 1994.

Mr Beggs also believes strongly that eventually, the Shuttle's operations, currently run by the NASA, ought to be turned over to the private commercial sector for marketing and operation, so as to make it a more realistic commercial operation.

This has already happened in Western Europe, with the Ariane, which having been developed initially by the European Space Agency is now the operational responsibility of Arianespace, a commercial company set up in 1980 with industrial and banking as well as government shareholders from 11 countries, with whom would-be users of the rocket place contracts for their launches.

Many of these projects will be satellite launching missions, but a large number will also carry payloads for the Department of Defence, or various scientific missions, especially using the European-developed Spacelab which fits into the cargo bay of the big Shuttle Orbiter vehicle.

The increased cost of a total Shuttle mission from October 1, 1985, will now be \$38m. (in

1975 prices, the base rate that NASA uses), which when adjusted for inflation means a 1982 cost of \$71m. This compares with the \$32m (in 1974 dollars) that a mission will cost up to 1985. This cost can be divided among all Shuttle users, when a multi-mission mission is undertaken.

NASA estimates that the cost of putting a communications satellite into orbit from 1985 will thus rise to anything between \$20m and \$41m, depending on satellite size. It says that these rates will be competitive for the charges for launching via the conventional Delta and Atlas-Centaur rockets, and also claims they will remain competitive with the charges set by Arianespace.

The latter organisation now holds firm orders for more than 24 rockets of which up to 13 will be launched by 1986, from the French space base at Kourou in French Guiana, many of them carrying communications satellite payloads.

Production of Ariane rockets is being increased, from the present 4.5 a year to between seven and eight a year from 1985.

Should demand increase (and everyone believes it will), Ariane output will go up to 10 rockets a year, matching the launching capacity that will be available from 1985 at Kourou, where a second launch facility is now being built.

It has already been decided to enlarge the capabilities of Ariane, with the development of Ariane 2/3 capable of orbiting larger satellites into orbit from 1983. The development of Ariane 4 will follow. This will have more than twice the capability of the original Ariane 1, and will enable it to put spacecraft or other payloads into orbit up to a total of 4,300 kilograms in weight.

The development plan provides for the first Ariane 4 (for which the development will cost about \$260m, in 1981 prices) to be launched in 1985 and become operational early in 1986.

Looking beyond these developments, both NASA and ESA are examining the possibilities of eventually putting permanent manned stations into near-Earth orbit, and further detailed studies for these are already planned. NASA expects to put its requests to the U.S. aerospace industry soon, while the ESA will also be commissioning a study from European industry.

NASA and ESA have already exchanged views on these matters at the highest levels, and it is possible, but by no means yet settled, that there will be collaboration between the U.S. and Western Europe in this field.

The most likely eventual course would be for the U.S. to launch the space station, with parts of it being contributed by Europe — as was done, for example, in the case of the Shuttle, which uses the European-developed Spacelab. While there will continue to be fierce competition between the U.S. and Western Europe for satellite manufacture and satellite launches, co-operation will continue in a wide variety of other space activities.

Michael Donne

Airships are back in the news again—Lynton McLain explains why.

Push to get financially airborne

EARLY THIS spring an airship flew serenely over the City of London, not on a passenger flight, but simply to fly the flag of its corporate owner, Airship Industries, in the hope of raising support, and much needed money from City investors.

The event was unremarkable in itself—airships make little noise and disturb few people. It was remarkable, however, as the first flight of a British-made airship over London for over half a century.

The flight raised hopes for the airship's designers, builders and financial sponsors of visible progress towards passenger and freight-carrying airships later this decade and into the 1990s. It also underlined the crucial importance of risk finance for airship development.

The reality of airship development, however, is still a long way from these ideals. The main stumbling block slowing the development and commercial and military acceptance of airships is the weakness of the commercial and tactical case put forward by airship supporters and the continuing viability of existing modes of transport. It is a disappointing fact for airship supporters that the commercial benefits of airships remain almost as uncertain this autumn as they did a year ago when Skyship 500 — Airship Industries' only airship and the one which flew over the city — took to the air for the first time.

This first anniversary has some poignancy for those hoping for a revival of the airship as a tool for commerce, industry and military authorities. Skyship 500 took to the air on September 28, almost exactly 51 years earlier, on October 4 1930, another British airship,



Skyship 500, designed and built by Airship Industries on its first flight over the City of London in April. The 50 metres long craft has a top speed of 72 miles an hour and can carry up to 18 passengers.

perhaps the most famous of all the ill-fated R101, took to the air on a maiden flight to India from Cardington, Bedfordshire. The flight ended in tragedy when R101 crashed at Beauvais, north of Paris with the loss of 47 lives.

It would be invidious to liken Skyship 500 with the doomed R101. The two craft could hardly be more different in design concept, in lifting gas and in their materials of construction. The only similarity is that both craft were assembled in the same huge hanger at Cardington.

The design of Skyship 500 was based from the outset on the use of new technology, new materials and new techniques not used before on lighter-than-air craft.

increased the area to be tested in the new airship. Skyship 500 is a prototype airship and it is also a flying testbed for the new materials, construction techniques and design ideas.

Airship Industries, as a result, has the task of proving the new technology as well as the general concept of the airship as a commercial form of transport or as a craft with military applications.

In addition, the company has to prove to potential users that its chosen route to airship design—the non-rigid envelope design of Skyship 500—is the best way forward.

Nevertheless, the new design features of Skyship 500 appear to work as their designers predicted, although few performance figures have been published by Airship Industries.

What is less certain is how far these design ideas and materials can be extrapolated successfully into larger, and potentially more commercially viable or useful airship designs.

At the moment, Skyship 500 is severely limited in its commercial and military applications and is very much a prototype. It has a top speed of 63 knots, 72 miles an hour; a limited range; and a payload of 10 seats, as a result of its small size, 164 ft long and 46 ft in diameter, and limited volume for lift.

Airship Industries has plans for a Skyship 600 craft and a Skyship 3000. The latter designed to carry 200 passengers and a payload of 25 tonnes for a total construction cost of \$7m.

Mr Keith Wickenden, the

CONTINUED ON NEXT PAGE

AEROSPACE IX

FREE WORLD HELICOPTER MARKET DISTRIBUTION OF CIVIL AND MILITARY MARKETS

	1972 - 1981	1982 - 1991
Military	9,900	8,300
Civil	9,100	15,500
Total Units	19,000	23,800

Source: SIKORSKY AIRCRAFT



Sikorsky Aircraft of the U.S. is now developing an advanced helicopter concept, (left), with contra-rotating blades, to give improved performance. Right, the Westland 30—a new helicopter for commuter airlines throughout the World from Westland Helicopters of Great Britain. In production for British Airways Helicopters, Airspur Inc. of Los Angeles, SFO Helicopters (San Francisco), and other operators, the W-30 seats up to 17 passengers in wide-body comfort

Expansion ahead for helicopters

THE WORLD'S helicopter manufacturing industry has been less affected by the recession than its fixed-wing counterparts, although the rate of growth which in the 1970s was running at about 5 to 6 per cent a year has slackened.

But with a continuing demand for military helicopters, and a widening range of uses for commercial helicopters now emerging, most manufacturers believe that the long-term future is bright, and that an annual growth rate perhaps even higher than that prevailing before the recession might be achieved, especially on the

civil side, in the mid-1980s and beyond.

This confidence is based on several factors. The first is that in the military sphere, armed forces world-wide are now placing much more emphasis on the use of helicopters as logistical "work-horses," troop carriers and combat weapons systems.

One example is the recent Falklands Islands situation, where the recapture of the islands would have been made much more difficult, if not virtually impossible, without the use of helicopters as anti-submarine warfare aircraft, troop ferries, and as "gun-ships," overland. As a result of all these factors,

significant military helicopter production programmes can be anticipated through the next decade.

On the commercial side, increasing use is already being made of helicopters. Their use in the off-shore oil and gas support industry is now almost legendary—those industries could not have been exploited so rapidly without the rotary-winged aircraft—and the list of other uses is growing rapidly.

General construction, timber harvesting, utility applications (such as police work, coast-guard, customs, harbour patrols, fire-watching, traffic surveillance and ambulance duties),

are now among the every-day uses for helicopters, while a major new market is also developing in corporate and executive transport as new aircraft are tailored specifically to the needs of such markets.

New technology, and in particular the use of new composite materials, giving greater weight savings and thus helping to reduce operating costs, together with new engines giving improved fuel efficiency, are all increasing the attractiveness of helicopters for commercial operations.

Moreover, in the past decade in particular, the helicopter industry has matured, in the sense that this type of aviation is no longer regarded as unusual or even dangerous, and has become increasingly accepted by the public at large, by the military, and by the air transport and general aviation industries.

While there may still be some

problems to be overcome—for example, noise is still an area to which more attention needs to be paid, especially before direct city-centre commercial operations can become widely acceptable—the overall "social acceptability" of the helicopter is improving.

One estimate of the future military and commercial turbine-engine helicopter market suggests that between 1983 and 1992, the total demand could be as high as 17,000 aircraft, worth \$1.7bn.

But as with other types of aircraft and engines, both commercial and military, the development costs of new ventures are soaring and, in many cases, are becoming prohibitive for individual companies. One result of this is that international collaboration is rapidly emerging as a major force in the industry.

This not unusual in Western Europe, where the UK and

France (Westland and Aerospatiale) some time ago collaborated on the development of the Gazelle light helicopter, the Puma tactical transport aircraft and the Lynx multi-role aircraft, and where Westland and Agusta of Italy are also now collaborating on the development of the new EH-101 as a Sea King anti-submarine warfare helicopter replacement, with civil versions also planned.

But the possibility of transatlantic helicopter collaboration is also now looming.

At the Hanover Air Show earlier this summer, Mr Robert F. Daniell, president of Sikorsky Aircraft, one of the world's biggest helicopter manufacturers, said that his company was "ready and willing to share its technology and production activities with world-wide allies."

Sikorsky is seeking industrial partners to produce its modern line of helicopters (including the S-76 commercial turbine aircraft and its R-60 Black Hawk series of advanced technology utility transports), as well as to help develop new models.

"We are not just seeking short-term co-operative efforts," said Mr Daniell. "We are also looking for long-term collateral development agreements on present and future programmes."

Mr Daniell made it clear that in Sikorsky's view, the costs of research and development were now such that every R & D dollar had to be used to its full potential.

"It should not be spent duplicating helicopter technology for each country just for the sake of it. No one can afford that type of R & D redundancy."

This message has not been lost on the European helicopter industry, especially in the military sphere, where the Anglo-Italian EH-101 is the latest collaborative venture to be established.

Mr John Nott, UK Secretary for Defence, reaffirmed earlier this summer that this new anti-submarine warfare helicopter would go ahead, and that it was hoped that a joint contract between the two countries could be signed early next year. Both commercial and military versions of the aircraft are planned, to increase the numbers sold and keep costs down.

Mr Nott said that the new aircraft would be heavier than the existing Sea King it is designed to replace, but it will be more agile, enabling it to operate from small ships safely in bad weather.

The EH-101 will also have a much greater load-carrying capacity, and will carry the new UK-developed Stingray torpedo as well as advanced sonic equipment.

generate considerable demand for advanced avionics and equipment, and provide continuity of employment for the UK and Italian helicopter industries for many years to come.

In addition to the commercial version of the EH-101, Westland is putting much emphasis on the civil W-30 development of the Lynx multi-role military aircraft. The W-30 has already entered service with British Airways Helicopters in the demanding North Sea oil and gas support role, and Westland is hoping that demand for the W-30 will eventually run to several hundred aircraft through the decade ahead.

In the military field, the role of the helicopter is also widening, and increasing use is being made of this type of aircraft as reconnaissance, anti-tank warfare and tactical assault transports overland, as well as in anti-submarine warfare at sea.

With eight major manufacturers (Westland of the UK; Agusta of Italy; Aerospatiale of France; Messerschmitt-Bolkow-Blohm of West Germany; and Bell, Boeing-Vertol, Hughes and Sikorsky of the U.S.) and several smaller manufacturers in the U.S. and elsewhere all competing for what is expected to be a market for upwards of 800 aircraft a year outside the U.S. (in that country the demand will be substantially higher), the market is expected to be tough.

It also seems likely that fewer entirely new types will emerge as development costs soar, and that the in-service lives of existing types, or their derivatives, will be extended, with much greater emphasis being placed on the weapons and other loads that these rotary-winged platforms will carry.

WORLD HELICOPTER MARKET

Estimates of values, 1982-91, in 1981 dollars

Type	U.S.	Europe	Rest of world
Civil	6.6bn	2.8bn	3.1bn
Military	7.5bn	5.0bn	6.5bn

(Source: Sikorsky Aircraft, U.S.)

Push to get financially airborne

CONTINUED FROM PREVIOUS PAGE

chairman of European Ferries which holds just over 11 per cent of the equity in Airship Industries, is convinced that the Skyship 5000 could offer an air service between London and Paris for passengers at £30 return.

Production of this larger and potentially commercial airship could start in 1984.

The total capital employed in Airship Industries is approximately £8m, with just under half, 44 per cent of this held by institutional shareholders.

The management of the company hold a quarter of the equity and 20 per cent is held by members of the public.

Borrowings stood at £250,000 in March, when the company announced an extraordinary development which could result

in the investment of a further £2.5m in airship designs by the Walloon Regional Government of Belgium.

Initially, the Walloon Regional Government subscribed and was allotted 325,000 shares at 125p each for £406,250 in cash. The Belgians have an option to buy a further 29 per cent of the equity.

Many of these developments are for the future. In the meantime a recent development which has effectively split the embryonic airship movement into two distinct camps is the formation of a new company to design and build rigid airships of conventional frame design.

This break-away movement is led by Major Malcolm Wren, a former chairman of Airship Industries with 3.6 per cent of

the equity in the company. He now runs Wren Skyships, a company based for the time being on the Isle of Man and committed to the concept of airships built with frame.

Aluminium alloy would be used for the rib framework of the rigid R-30 airship proposed by Wren Skyships and an alloy skin would also be used.

"The company has completed the conceptual design of this proposed rigid airship for use as a maritime patrol craft."

R-30 would have a lifting volume of 1m cu ft of helium, based on a frame 337 ft long, 75 ft in diameter, with four fins and four engines in two nacelles. The top speed would be 134 knots. Payload would vary from 15 tonnes, when the craft would have a range of 250

miles, to a crew of 13 for patrol duties when the range could be as high as 4,300 miles.

The move away from non-rigid airships of the Skyship 500 design to rigid designs with ribbed metal frames was based on the belief that non-rigid designs would be limited in size to craft with about 30 tonnes maximum payload.

£12m sought

Also, rigid airships would be designed and built on "absolutely conventional aviation grade technology," Wren Skyships said recently. There would be no need for the designers to try new technology, certainly not until the concept of the rigid airship had been proved.

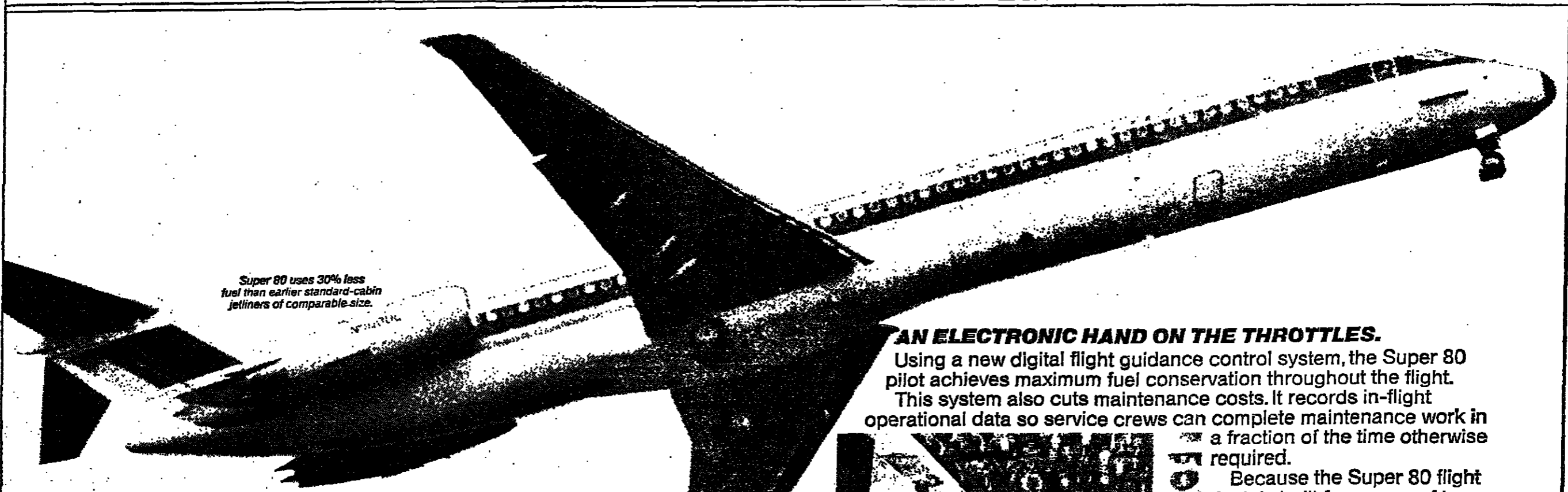
Wren Skyships is currently seeking a total of £12m to fund the rest of the development, detailed design and production of the first R-30 airship.

Substantial amounts of tooling are likely to be needed for series production of the craft and the company estimates that as much as £21m would be needed to produce 50 R-30 craft, which would sell at £45m each.

The company claims to have identified a total market for 200 airships of the R-30 type with applications in maritime patrol, passenger carrying and the carriage of low density, high bulk cargoes.

The company accepts, however, that it is still a long way from raising the money and that proving the commercial case for the airship is still the most crucial task.

ABOARD THE SUPER 80, EVEN THE AIR YOU BREATHE SAVES FUEL.



Super 80 uses 30% less fuel than earlier standard-cabin jetliners of comparable size.

OPERATING COST SAVINGS TOTAL \$1.5 MILLION U.S. A YEAR.

At McDonnell Douglas, we designed the Super 80 to squeeze every bit of energy from every drop of fuel.

The Super 80 flies more passengers farther on 30% less fuel than the airplanes it replaces. Even the Super 80's cabin ventilation system saves fuel—by reducing the role of engine power in supplying clean, fresh cabin air.

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Using a new digital flight guidance control system, the Super 80 pilot achieves maximum fuel conservation throughout the flight.

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The bottom line? A \$1.5 million savings in annual operating costs compared to today's most widely-flown jetliner.

More than 70 of our New Generation Super 80 jetliners are now in service on four continents, proving the plane's cost efficiency in hour after hour of comfortable, reliable, quiet flight.

AEROSPACE X

COSTS OF BUSINESS AND LIGHT AVIATION
Typical operating costs and performance for light executive aircraft

	Seats	Speed in knots	Range in nautical miles	Capital cost (£)	Annual fixed cost (£)	Hourly cost (£)
Twin-engined:						
Piper Cheyenne III	11	290	2,240	1,020,000	37,890	190.45
Piper Navajo Chieftain	8	220	1,415	260,000	27,700	138.30
PA 34 Seneca III	6	193	990	135,000	9,300	80.31
PA44 Turbo-Seminole	4	185	820	105,000	8,250	53.85
Single-engined:						
Piper Warrior	4	127	640	35,000	7,195	25.67
Piper Arrow IV	4	143	935	60,000	11,495	26.20
Piper Saratoga SP	6	150	960	75,000	7,712	30.47

Source: CSE Aviation, Oxford.

GENERAL AVIATION

Aircraft market estimates 1983-82

Aircraft type	U.S. market Units	Non-U.S. market SB Units	U.S. market SB Units
Feeder - commuter fixed wing	1,100	3.6	4,700
Business-utility fixed wing	10,500	26.4	15,300
Helicopters	7,800	7.8	9,500
Total market	19,400	37.8	39,500

Turbine engine market estimates 1983-82

Aircraft type	U.S. market Units	Non-U.S. market SB Units	U.S. market SB Units
Feeder - commuter fixed wing	3,100	0.8	4,400
Business-utility fixed wing	22,600	5.7	10,700
Helicopters	12,700	1.4	15,500
Total market	38,400	7.9	35,600

(1982 dollars)
Source: Pratt and Whitney Aircraft Group (U.S.A.)

Lynton McLain examines the impact of the decline in economic activity, the rise in fuel prices and the high cost of operating aircraft in the general aviation category

International demand for general aviation aircraft has plummeted

PRODUCTION OF new light aircraft for business and pleasure has plummeted in the U.S. and the industry faces its most testing time for years. The U.S. is the world's main light aircraft manufacturing base and is the main market for general aviation aircraft, ranging from turboprops and turboprops to single-engined piston aircraft.

Exports from the U.S. have also fallen, reflecting the decline in economic activity in world markets for business and light aircraft.

The previous high rates of growth in the fleet of general aviation aircraft in the U.S. have slowed substantially. Total flying time by these aircraft has dropped sharply as companies operating the aircraft retrain pilots in the face of zero growth in their own sectors.

These trends reflect the impact of the decline in economic activity, the rise in fuel prices and the high costs of operating aircraft in the general aviation category.

The sector embraces aircraft for use by companies and individuals on business, for pleasure, for use as agricultural spray platforms, as computer carriers, air taxis and as platforms for specialised industrial work such as surveying, photography and pipeline patrols. Most of these have been hit by the recession.

The decline in economic activity has forced many users, but especially those using aircraft for business purposes, to re-assess the cost-effectiveness of the aircraft at a time when management is under pressure to cut costs.

Business aviation is in the doldrums in terms of economic activity

Business aviation is in the doldrums in terms of economic activity

The aircraft Association of the U.S. in a speech to business aircraft operators earlier this summer.

Forecasts by the U.S. Federal Aviation Administration (FAA) predict that growth in the general aviation sector as a whole between 1981 and 1983 will average 4.4 per cent a year. At this growth rate the FAA estimates that the fleet of 10,000 aircraft a year over the same period.

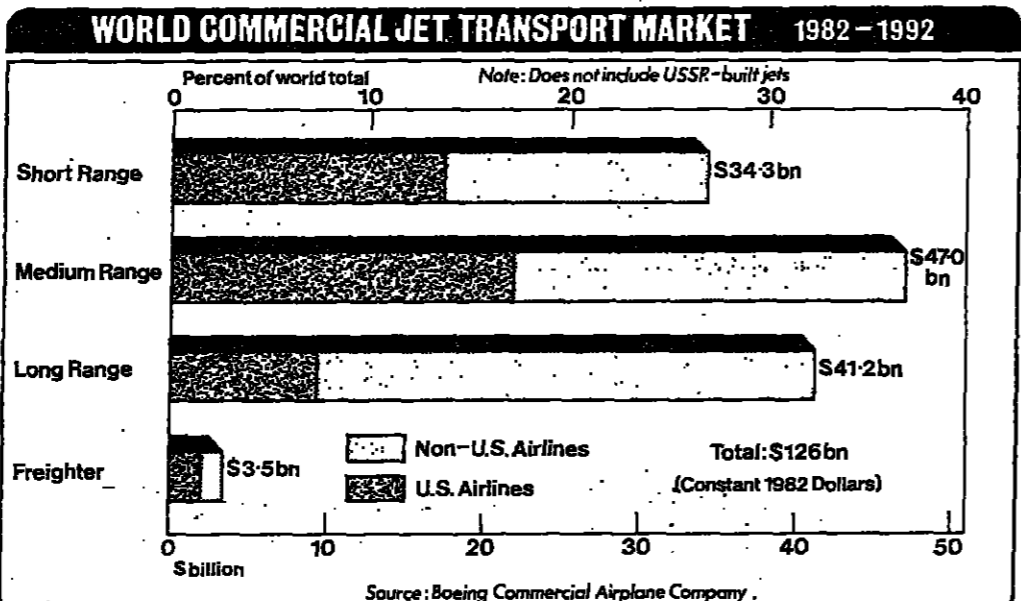
In particular the number of turboprop aircraft is expected to double to 9,500 by 1983 and the number of turbojet aircraft also is expected almost to double to 6,300 over the same period. These are the categories of aircraft favoured by business operators who are likely to provide much of the new business when the recession lifts.

Meanwhile, "business aviation is in the doldrums in terms of economic activity," according to Mr John H. Winant, president of the National Business Aircraft Association of the U.S.

FORECAST SIZE OF U.S. FLEET OF GENERAL AVIATION AIRCRAFT, 1982-1993

Forecast as of	Total	Piston				Turboprop	Turbojet	Rotorcraft	Balloons, dirigibles, gliders
		Single-engine	Multi-engine	Turboprop	Turbojet				
1982	220.4	173.9	26.6	4.8	3.3	3.0	3.5	5.3	
1983	226.4	178.0	27.6	5.2	3.4	3.1	3.6	5.5	
1984	233.2	182.7	28.6	5.6	3.6	3.2	3.7	5.8	
1985	241.6	188.9	29.6	6.0	3.8	3.3	3.9	6.1	
1986	250.3	195.3	30.7	6.4	4.2	3.7	4.2	6.8	
1987	260.5	203.0	31.8	6.4	4.0	3.5	4.0	6.5	
1988	271.6	211.2	33.1	7.2	4.4	3.9	4.5	7.3	
1989	284.6	221.1	34.6	7.6	4.7	4.1	4.7	7.8	
1990	300.3	233.0	36.4	8.0	5.1	4.4	5.0	8.4	
1991	317.3	245.8	38.4	8.5	5.5	4.7	5.4	9.0	
1992	334.7	259.0	40.4	9.0	5.9	5.0	5.7	9.7	
1993	352.7	272.7	42.4	9.5	6.3	5.3	6.1	10.4	

Source: FAA.



In Britain general aviation is much less well developed than in the U.S. A total of 6,738 general aviation aircraft are registered in Britain, with almost two thirds used for private and business purposes. These aircraft have access to over 200 airfields in Britain and an estimated 2,000 or more airfields throughout the continent, according to the General Aviation Manufacturers and Traders Association based near Aylesbury.

Most of these airfields are within easy access of centres of population and can provide a rapid transport link for business executives wishing to avoid the queues and the hassle of major airports such as Heathrow.

The association says that general aviation in Britain is not dominated by leisure and sport flying. These activities account for only 10 per cent or less of all light aircraft operations in the country, compared with business aviation, which

Turbo jets and turbo props were the only two categories of light aircraft to show growth in the U.S. last year

accounts for 85 per cent of all the hours flown by light aircraft. Training accounts for 20 per cent of the time and agricultural aviation and other aerial work about 6 per cent.

Business aircraft are "time-machines," offering the convenience of direct travel between points which may have no formal air connections, the association says. At the same time access to a business aircraft makes it possible for business executives to tailor their journeys so as to fit complex multi-stop journeys into their working days.

Provided the company has done its sums this approach could save time and money and could increase substantially the productivity of the executive. The company has to compare business aircraft costs with the total costs of using conventional transport, a commercial airline, taxi to and from airports and possibly a night in a hotel because a return flight is not possible within a sensibly long working day.

Air taxi companies offer a similar service to business executives but without the executive incurring the costs of owning a business aircraft.

Britain has over 100 specialist companies offering air taxi services based on 250 light aircraft, from multi-engine piston, turbine and jet aircraft to helicopters. This fleet carries over half-a-million passengers and 4m kg of freight throughout Europe, Africa and the Middle East each year.

The air taxis are available on an ad hoc basis or on regular charters to provide a personal service and a role the commercial airlines do not offer.

role of general aviation aircraft and accounts for 46 per cent of all flying, followed by business use with 23 per cent and aerial spraying with 7 per cent of all flights.

This mix of applications is likely to change in favour of business aviation if the recent growth in the sales of advanced turbojet and turboprop aircraft, mainly for business use, continues, while single engine piston aircraft used for personal and sports flying suffer in the face of the recession.

Already there is evidence that greater use has been made of these more advanced aircraft than of the less sophisticated types. The National Business Aircraft Association, using FAA data, shows that turboprop aircraft were used three times as much as general aviation aircraft on average in 1980, despite the slowdown in business activity.

The larger the aircraft the more accentuated was this difference. Twin-engined turboprop aircraft with over 13 seats flew five times as much as the 190.5 hours average for light aircraft in 1980.



The D-3300 is the latest design study by McDonnell Douglas of the U.S. for the projected 150-seater airliner in which several manufacturers are showing considerable interest for the later 1980s

Bankers had predicted that \$160bn in new cash would be needed to purchase aircraft worldwide in the next decade—but these estimates are being scaled down, as Alan Friedman reports.

Airline financiers are taking an increasingly cautious viewpoint

"OUR MOTTO this year is don't be brave, be smart." These words came from Mr Tony Cooper, head of Midland Bank's aerospace finance department. They seem somewhat rather more than poignant coming from an aerospace banker seated at a table just yards away from a desk-top model of Sir Freddie Laker's Skytrain.

Mr Cooper's bank has received a fair amount of criticism over the collapse of Laker Airways last February and although Midland's financial losses are controllable, the psychological damage is not. Beyond the unfortunate tale of Laker Airways, however, is the more alarming financial condition as a whole of the (big orange) has declared bankruptcy and several other U.S. airlines are facing similar collapse.

The recession continues to affect air travel. The dramatic growth of many airlines in recent years is resulting in a text-book case of overcapacity. All this in turn raises a large question mark over the hitherto glamorous business of airline finance.

Until recently the accepted wisdom was that of a total of \$160bn in new cash would be required over the next decade to finance the purchase of aircraft worldwide. While the aircraft makers may remain hopeful about the long-term outlook, bankers are now scaling down this estimate as too optimistic.

Since 1979, when Midland set up its specialist Airbus department, it has extended a total of \$2bn of aircraft loans. Of this lending around 80 per cent is

backed by guarantees from the Export Credit Guarantee Department (ECGD). A further 15 per cent of the exposure is on state carriers and the balance, according to Mr Cooper, is to independent carriers.

Mr Cooper claims that "his aircraft book" is as solid as the Rock of Gibraltar. He is not worried about Midland Bank's exposure. What about the precarious state of several airlines? This does not threaten Midland if there are state guarantees.

Not only is there less business; other banks are training their sights on the market leaders. In the UK both Lloyds Bank and National Westminster Bank have recently taken business away from Midland.

Lloyds Bank, which says it will be taking a more aggressive stance, recently completed an \$85m 10-year credit for Air India as part of an Airbus finance package.

For a variety of reasons Lloyds was able to offer more attractive terms than Midland. But Midland insists it is still predominant when it comes to export credits for Airbus deals. Since 1979, when Midland set up its specialist Airbus department, it has extended a total of \$2bn of aircraft loans. Of this lending around 80 per cent is

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WORLD JET AIRLINER TYPES AVAILABLE DURING THE 1980s

CATEGORY	TYPE	CURRENT MAKER	ENGINES	NUMBER OF PASSENGERS ‡ (approx.)	POSSIBLE FUTURE		
					TYPE	MAKER	ENGINES
SHORT-RANGE (up to 2,000 nautical miles approx.)	One-Eleven	British Aerospace	Two	69-119	7 DASH 7	Boeing	Two
	F-28	Fokker	Two	65-85	A-320-100/200	Airbus Industrie	Two
	DC-9-30/80	McDonnell Douglas	Two	105-172	D-3300	McDonnell Douglas	Two
	737-200	Boeing	Two	115-130	DC-9 RE(a)	McDonnell Douglas	Two
	737-300	Boeing	Two	121-148	TA-9-100	Airbus Industrie	Two
	747 SR*	Boeing	Four	450			
	146-100/200	British Aerospace	Four	71-109	DC-10 Derivatives	McDonnell Douglas	Three
	727-200	Boeing	Three	140-189	747 Stretch	Boeing	Three
	757-200	Boeing	Two	224	TA-9-200	Airbus Industrie	Two
	767-200	Boeing	Two	255	727 RE(a)	Boeing/Lockheed	Two
	A-300-2/4/600	Airbus Industrie	Two	220-336			
MEDIUM-RANGE (Up to 3,500 nautical miles approx.)	A-310	Airbus Industrie	Two	195-255			
	DC-10-10	McDonnell Douglas	Three	250-400			
	L-1011	Lockheed	Three	250-400			
	747-100/200	Boeing	Four	482	767 HGW(b)	Boeing	Two
	747 SP5	Boeing	Four	330	DC-10 Derivatives	McDonnell Douglas	Three
	DC-10-30/40	McDonnell Douglas	Three	250-400	747 Derivatives (d)	Boeing	Four
LONG-RANGE (Over 3,500 nautical miles approx.)	L-1011-500	Lockheed	Three	250-400	TA-11-100/200	Airbus Industrie	Four
	747 F/C	Boeing	Four	—	TA-12	Airbus Industrie	Two
	DC-10C	McDonnell Douglas	Three	—			
FREIGHTER	A-300C	Airbus Industrie	Two	—	757/767F	Boeing	Two



Laker Airways aircraft standing outside their base at London's Gatwick Airport. Beyond the unfortunate tale of Laker Airways is the alarming financial condition of the world's airline industry

Boeing 727 aircraft of Braniff International at Dallas/Fort Worth, Texas

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Lynton McLain examines the scale of spending forecast for the expansion of international airports.

Airport planners remain optimistic

WORLD AIRPORTS are emerging from one of their worst trading periods for many years. Passenger and air freight volume plummeted last year. Traffic this year, however, is picking up slowly although there are few signs as yet that airports are set for an immediate return to the buoyant rates of growth of the late 1970s.

Nevertheless, airport planners predict confidently that growth will return to the passenger and air freight markets. This confidence is supported by recent modest returns to growth already noted, ahead of this year's traditional summer peak, and by the scale of spending forecast for airport expansion plans.

The underlying strength of air transport was noted by Mr Norman Payne, the chairman of the British Airports Authority, in his latest annual report. This showed that passenger traffic at the authority's seven airports in the UK increased by 1 per cent in the 1981-82 financial year despite the continued depressed state of world economies and only tentative indications of an improvement in the UK's economic health, Mr Payne reported.

About-turn

The modest about-turn in the fortunes of airport operators so far this year is illustrated by recent figures for traffic at Heathrow Airport, London, the BAA's main airport and still the busiest international airport in the world, with 22.5m international passengers last year despite the slump in demand for air services.

The sharp drop of 9.5 per cent in air transport movements at Heathrow in 1981 compared with the previous year has been reversed in recent months and in June aircraft movements were 8 per cent higher than in June 1981.

Similarly, the 3.9 per cent drop in the number of passengers at Heathrow last year compared with 1980 has been reversed this year, with passenger volume 6 per cent up in June compared with the corresponding month last year.

These returns are encouraging signs for airport planners that traffic is returning to historic patterns of growth. They also underline the need for increased airport capacity.

Forecasts from airport authorities suggest that the total market for new airports and for the expansion of exist-

ing airports is likely to be worth not less than \$20bn by the year 2000.

Much of this spending was committed before last year's slump in demand for airline services and all the signs suggest that developments are likely to go ahead on much the same timescale as planned.

Major airport development programmes are underway in most countries of the developed and developing world. Some of the projects, such as that for the second Bangkok international airport, are on green-field sites and will involve multi-million dollar programmes. Other projects are more modest and involve an updating of passenger facilities and equipment for aircraft control and handling.

Airport projects in the 1970s and 1980s have involved, to a greater and greater extent, specialised groups of international airport consultants. In Europe these include Aeroporti de Paris and Sofresavia of France; the Frankfurt Airports Authority of West Germany; NACO, the Netherlands airport consultancy organisation; and the British Airports International BAI group.

BAI is a partnership of airport specialists from the British Airports Authority, which runs seven of Britain's airports, and International Aeradio (IAL), the airport management consultancy and equipment maker majority owned by British Airways.

An international consortium recently won a \$1m contract to carry out a feasibility study for an international airport in Macau. Members of the consortium are Consuplano of Lisbon, Portugal; China Airport Engineering Consultants (CAEC) of Beijing; Stradbag Bau, of Cologne; Lufthansa German Airlines, Cologne; and HLT, Wiesbaden. The project is to be managed by Airconsult, a subsidiary of Flughafen Frankfurt-Main, the Frankfurt Airport Authority.

Typical of the international airport projects currently underway are those involving BAI. The group is working on over half-a-dozen major airport projects, most of them in small and medium-sized countries with developing air transport systems.

The group starts work in September on preliminary designs for a new international tourist airport at Tabarka in north west Tunisia. The airport BAI is on the short list for

Airport	Country	Air transport movements		Terminal passengers		Cargo (tonnes)	
		000's change	%	000's change	%	000's change	%
Amsterdam	Netherlands	138.1	- 3.9	9,669	+ 2.9	329.7	+ 3.7
Brussels	Belgium	81.7	- 4.9	5,060	+ 2.0	156.6	- 5.4
Copenhagen	Denmark	134.3	- 7.5	8,192	- 4.5	139.6	+ 0.1
Frankfurt	West Germany	297.0	- 0.9	16,953	+ 0.5	600.0	- 0.9
Geneva	Switzerland	68.5	- 1.4	4,171	+ 5.5	32.7	- 5.5
Glasgow	Scotland	49.3	- 3.1	2,267	- 3.1	12.4	- 3.7
Lisbon	Portugal	38.0	- 3.8	2,940	+ 5.0	46.2	- 5.7
London (Gatwick)	England	125.1	+ 1.3	10,729	+10.5	182.5	+10.4
London (Heathrow)	England	247.1	- 9.5	26,400	- 3.9	460.4	- 3.8
Madrid	Spain	114.4	- 7.5	9,960	- 1.8	151.0	+ 4.8
Paris (Charles de Gaulle)	France	202.0	- 0.5	10,935	+ 4.4	447.3	+11.2
Rome	Italy	134.6	- 6.6	10,921	+ 3.0	124.5	-11.3
Atlanta	U.S.	523.1	- 6.4	37,594	- 6.3	329.4	+ 5.7
Chicago (O'Hare)	U.S.	554.5	-11.2	37,976	-14.3	792.0	- 2.0
Dallas (Fort Worth)	U.S.	445.8	+ 2.3	23,533	+ 7.2	218.4	+10.8
Hong Kong	Hong Kong	55.4	+ 1.5	8,224	+20.4	390.3	+12.6
New York (JFK)	U.S.	228.0	- 3.4	25,752	- 3.9	1,191.5	+ 1.9
Washington (National)	U.S.	193.5	- 4.5	14,175	- 2.5	20.1	-21.5
Sao Paulo	Brazil	102.9	+ 2.2	5,621	+ 3.7	69.2	+27.4
Tokyo (Haneda)	Japan	224.0	-	21,235	+ 2.0	202.3	+ 4.3

Source: British Airports Annual Report 1981-82.

is expected to be operational in 1986. BAI is also working on a pre-feasibility study for a second international airport for Tunis, to provide capacity up to the year 2030.

The group is also involved in work for the new Baghdad airport, Iraq and is training 400 Iraqis in airport management techniques.

Elsewhere, airport feasibility projects are underway in Hong Kong, where plans are still in hand for a major new international airport possibly at Shep Lap Kok on Lantau Island, where the total cost of replacing Kai Tak airport could be HK\$7bn, or even more depending on associated infrastructure costs.

In Malaysia a national airports systems plan for three secondary international airports is being considered; in the Cameroons BAI is involved in aspects of the design for the proposed green-field airport at Bamenda; in Jordan the new Queen Alia International Airport built by John Leung of the UK is to open soon, and at Agadir, Morocco, consultants, among others to be sub-contractors to the consultancy for the project.

design work for a new green-field airport.

The largest project the international consultancy groups are bidding for at the moment is the proposal for a second international airport at Bangkok. This proposal, the so-called "Cobra Swamp" project, is for a new major international gateway airport for Thailand, to be built at Nog Nua Hoa, to handle 10m passengers a year.

Competition for a major share in this project is intense. BAI and five UK civil engineering consultants joined together to form the British Airport Consultancy group at the end of last year to make a single concerted British bid for contracts to carry out the main economic study and the preliminary and final design studies for the "Cobra Swamp" airport.

Sub-contractors

The new consultancy has invited the UK Civil Aviation Authority, Kleinwort Benson (merchant bankers) and Coopers and Lybrand, management consultants, among others to be sub-contractors to the consultancy for the project.

Existing airports last year were dominated, however, by the general decline in passenger and air freight activity, with airports in Europe, the U.S. and elsewhere almost all hit by the general fall in air transport movements.

In Europe the fortunes of airport operators ranged from the substantial fall of 26.4 per cent in air transport movements at Prague airport, Czechoslovakia, to the increase of 9 per cent in aircraft movements at Tenerife's Reina Sofia airport.

Generally the airports with growth last year were those airports with relatively modest traffic flows, such as Dublin with a 5.8 per cent increase in passengers; Helsinki with a 6.1 per cent increase in passengers; Istanbul with a 24.8 per cent increase in passengers; Nice with a 9.8 per cent increase in passengers; and Stockholm, with a 8.7 per cent increase in passengers.

Downturn in traffic volume were reported by most airports serving industrial and commercial centres throughout the world, while airports serving holiday centres generally

handled more people last year than in 1980.

Other centres with greater-than-average air traffic activity included cities with oil-related business, including Houston, Texas, with 3.5 per cent more passengers last year, and Mexico City, with a 14.7 per cent increase in passenger volume.

The general decline in air transport movements at U.S. airports last year, however, has to be seen against the background of the strike by U.S. air traffic controllers. The strike disrupted normal patterns of airline operations and increased the volume of private and business aircraft traffic.

The extent of the slump is clear when last year's 38m passengers at Chicago O'Hare International Airport are compared with the 46m passengers who used the airport in 1978, its peak year.

Nevertheless, the City of Chicago Department of Aviation is confident about future demand and has a master plan to boost capacity at the airport to about 80m passengers a year by the end of the century.

Despite the downturn in traffic world airports still handle great numbers of passengers and thousands of tonnes of freight last year. Chicago O'Hare airport was the busiest in the world in terms of terminal passengers, with a total of 37.9m domestic and international passengers, a volume rivalled only by Hartsfield Atlanta International Airport, with 37.5m passengers last year, 6.3 per cent down on 1980. Hartsfield is continuing to feel the slump in demand and in June, the latest month for which figures are available, passenger numbers dropped by 10.2 per cent, to 3,02m compared with June 1981.

All this decline in demand for air services has not stopped almost all countries, including the U.S., from investing in new terminals, new runways, advanced passenger handling facilities and complete new airports, sometimes for prestige purposes but generally to handle future demand for air travel.

In Britain the British Airports Authority (BAA) has forecast an average annual growth rate of between 4.5 per cent and 6 per cent for air traffic into and out of the UK for the rest of the 1980s. A slightly lower rate of growth, between 3 per cent and 5 per



Part of the new Hartsfield Atlanta International Airport, claimed to be the largest passenger terminal complex in the world and second only to O'Hare in Chicago in total number of passengers handled each year.

cent a year, is forecast by the authority for the 1990s.

To help meet this expected increase in demand for airport capacity, the BAA plans to spend \$550m (March 1982 prices) on its seven airports by the 1985-87 financial year. This expenditure is on top of the \$237.8m spent by the authority in the last financial year (1981-82) to raise capacity and to boost operational efficiency at its airports.

The BAA plans to spend the greatest part of this future expenditure on its proposed development of the third London airport at Stansted. This will involve £200m for a new terminal building and other facilities to raise the capacity of Stansted from its present 1m passengers a year to 15m passengers a year under the first phase of development. This would be based on the existing single runway at Stansted.

The BAA would like to add a second runway eventually to boost the capacity of Stansted to 50m passengers a year.

New Terminal Four

The second largest investment project earmarked by the BAA under its current corporate plan involves spending £173.9m on the new Terminal 4 at Heathrow Airport, London. Work on this project to boost capacity at Heathrow from 30m to 38m passengers a year by the mid-1990s has already started.

The authority also plans developments at the existing three terminals at Heathrow, involving over \$40m of further investment. Motor traffic flow in and around the airport is also to be improved, with £12.5m earmarked for new

roads and car parks.

The authority wants extra capacity at Gatwick Airport and £131.5m has been allocated in the corporate plan for the first phase of the proposed new Terminal 2 at Gatwick. The Terminal has been recommended for approval after a public inquiry but the go-ahead from the Government is still awaited.

The BAA also plans to spend several millions of pounds at its four airports in Scotland—Edinburgh, Glasgow, Aberdeen and Prestwick. The authority acknowledges that it will have to borrow to complete this \$80m investment programme but it still hopes to self-finance at least 60 per cent of the total programme.

At the same time, the Authority has set up a working group with the Treasury and the Trade Department to study ways of providing private capital for the investment programme over the next five years. The issue of a "general performance bond" linked to the authority's profits is one idea. The other main proposal to be considered is the possible provision of equity finance through a subsidiary company. This would then participate in the authorities' concessionary income — duty-free goods, rents and franchises — on a royalty basis. The authority would like to raise between \$50m and £100m from external sources.

Elsewhere in Britain the 23 main local authority airports expect to spend a total of \$50.5m in 1982-83 on airport developments. More than 12.5m passengers are expected to use these provincial airports, a rise of over 4 per cent compared with 1981-82.



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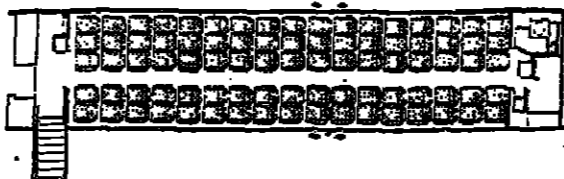
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AEROSPACE XII

Aerospace developments around the world: here and on the following six pages, FT correspondents examine advances being made by individual nations.

Fighting hard to keep pace with the West

DEVELOPMENT of a modern and diversified civilian and military aerospace industry has long been a top Soviet priority and proof to itself and others of the scientific and technological progress made by the Soviet Union since the 1917 revolution.

It is becoming increasingly clear, however, that the Soviet aerospace industry is finding it increasingly hard to keep up with the pace of technological change and development generated by engine and airframe companies in the West which, in turn, are being forced to pool resources and rationalise their production in order to find the huge sums required to develop new fuel-efficient engines and airframes.

Traditionally, Soviet civilian aircraft tend to lag a

generation behind their western counterparts, the latest example of this being the belated introduction of the Ilyushin IL-86, the Soviet Union's first wide-bodied "Airbus" on domestic and international routes over the past 12 months.

Now that the 350-seat, four-jet aircraft is in service to Western capitals, such as Paris and Madrid, the Soviets have finally agreed to allow Western wide-bodied aircraft to fly through Soviet airports.

The first Jumbo jet of Air France inaugurated a new wide-body service from Tokyo across Siberia via Moscow to Western Europe in April and Air France now also flies Airbuses to the Soviet capital. In return, regular Aeroflot IL-86 flights link Paris to both Moscow and Leningrad.

Although the Airbus is now operational, realisation of its full potential awaits future modifications—including more powerful and more fuel-efficient engines than the 28,000 lb thrust motors powering the current models.

On most flights Aeroflot aircraft fly with the maximum permitted passenger loads. Tickets are still relatively cheap for Soviet passengers and vast distances make air transport the preferred means of transport for millions of Soviet citizens.

Over 530m passengers will be carried by Aeroflot over the current five-year plan period at seat capacity ratios

which is needed for the harsh weather conditions and frequently non-tarmac runways of many Soviet provincial airports, especially on internal feeder routes.

But export sales so far have been relatively modest and concentrated on other Comecon airlines, including Cuba and Vietnam. Export sales in 1980 were around 600m roubles (\$750m).

But considerable interest has been generated in the 40-ton capacity, high wing, four jet IL-76 civilian and military transport aircraft, of which several have been sold to Iraq, Libya and other countries.

The new Yak-42 intermediate range aircraft with rough airstrip take-off capacity and high climb rate also has considerable export potential, as did its predecessor, the smaller Yak-40.

Avia-Export, the Soviet aircraft sales and service organisation, also has high hopes for its AN-72 STOL aircraft, which attracted much attention at the Paris Air Show.

Soviet helicopters also have a high reputation, reflecting the resources which have been channelled into an area with major military and civilian applications—especially in transporting heavy or bulky equipment to mining camps and pipeline installations often sited in trackless wastes or permafrost areas of the east and far north.

Development of hovercraft, dirigibles and other "lighter than air" craft is also proceeding apace.

Meanwhile, in space the Soviet Union continues to send up large numbers of military and civilian satellites for a wide range of purposes and continues with its Soyuz manned orbital space platform programme.

A Frenchman—Jean-Louis Chretien—and two Soviet Cosmonauts successfully rendezvoused in space with the Soyuz-7 Station in July, the first East-West space venture since the Apollo-Soyuz link-up between U.S. and Soviet spacecraft in 1975.

The Soyuz programme continues, as does military development of killer satellites, orbiting laser guns and other "Sci-fi" horrors.

SOVIET UNION

which would make fortunes for Western airlines forced by competition to slash fares and still fly at around 60 per cent capacity.

Despite high capacity utilisation, however, the high fuel consumption of most Soviet aero-engines has stimulated development of more fuel-efficient variants and these have been introduced on modified versions of the Tupolev TU-154 intermediate-range tri-jets and TU-134 twin-engine jets. A new fuel-efficient engine, code-numbered the Lotarev D-36, has also been developed to power the new 120-seat Yakovlev Yak-42 tri-jet and the new high-wing STOL aircraft, the Antonov AN-72.

Fuel consumption of the D-36 engine is claimed at 34 grammes of fuel per passenger/kilometre.

But the most pressing need of the Soviet civilian aircraft industry is for the introduction of high-efficiency by-pass engines similar to those produced by Rolls-Royce and the major U.S. and European engine consortia.

This need is highlighted not only by problems with the Soviet Airbus but also by the worrying frequency of crashes suffered by the IL-62 long-distance airliner with its four heavy and thirsty rear-mounted engines.

Although heavier and less efficient than comparable Western aircraft, Soviet models do have a ruggedness

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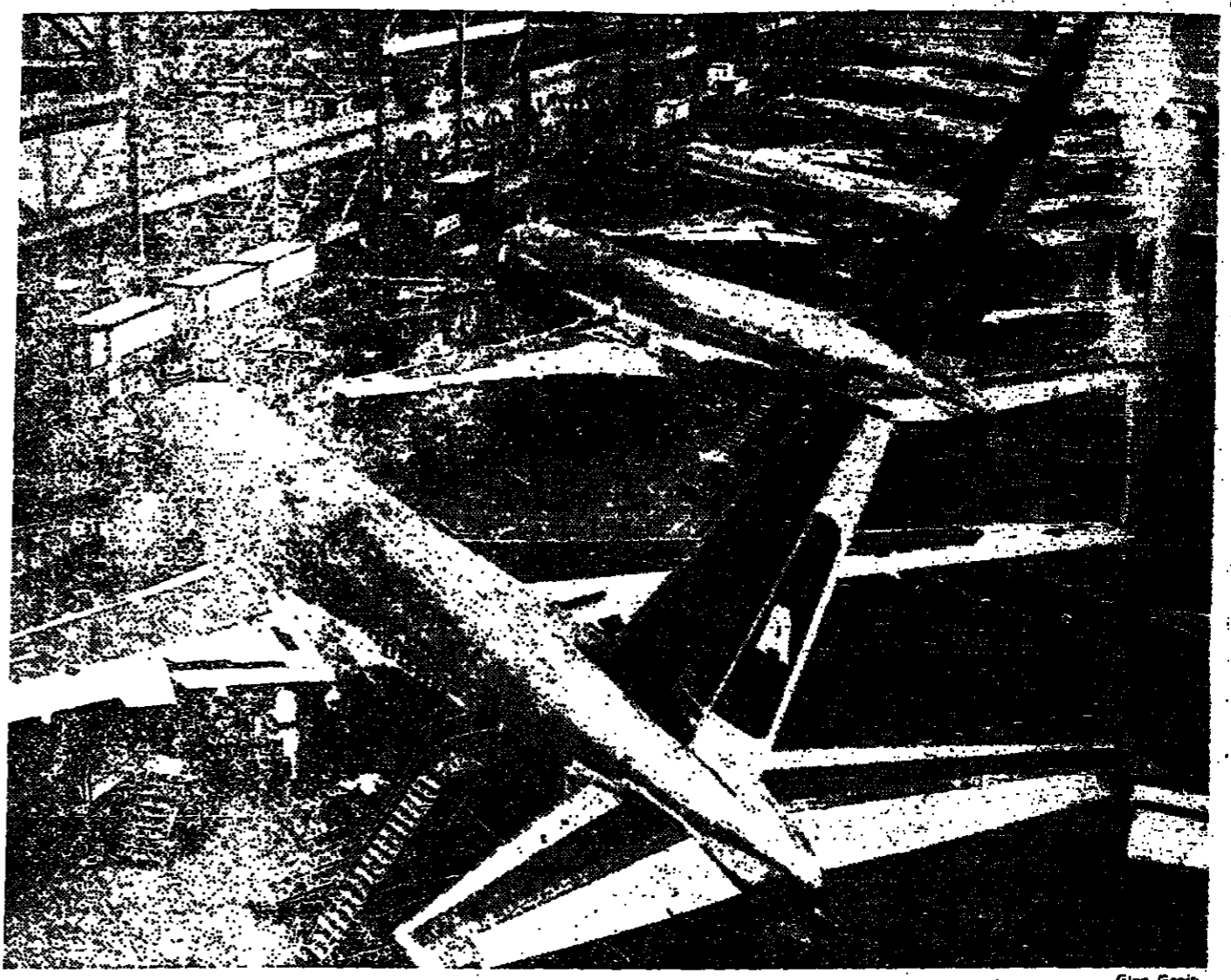
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Boeing 747 jet airliners seen in production at the company's Everett, Seattle, factory where 747 Jumbo jets are also built. The 767 is one of several new types of jet airliner under development and in production by Boeing, the others being the 757 twin-engine aircraft; the new Series 300 version of the 737; and the "extended upper deck" version of the 747 Jumbo itself.

Surprises on all fronts

THE PAST twelve months have brought a series of significant and sometimes bewildering developments for the U.S. aircraft industry. No doubt the lights are burning late at night in the offices of the major manufacturers, as they piece together the likely prospects for future sales.

On the civil side, the final collapse of Braniff and, to a lesser degree, of Laker Airways, may have added some more unusable capacity to that ghostly air fleet sitting in the Californian desert, and elsewhere, but they have also checked to some extent the industry practice of virtually suicidal price cutting.

On the military side, the Reagan Administration's defence policies, and the success of the testing period of the Space Shuttle, all augur well for the future of the Aerospace industry. Finally, the Argentine conflict has added a joker to the pack, by stimulating widespread debate inside the U.S. defence industry over its implications for a whole range of military and naval hardware and strategy.

The latest batch of results from the major U.S. airlines indicated that progress is being made towards a return to health. Pan American World Airways, which has been a cause of some nervousness ever since it was caught out by the first surge in oil prices in the post 1973 period, has cut its losses, in half in the second quarter, and confirmed that it expects to be in profit in the current three-month period.

Similar trends are indicated by the other major carriers, and this will be good news for the major manufacturers whose order books for civil aircraft are not all that healthy at present.

But there is one warning note for the aerospace manufacturers, from the analysts of the industry, Goldman Sachs, the Wall Street investment house, is among those who warn that the route back to health for the prudent airline manager will be via further control and cutting of costs. It will almost certainly not be via seeking further funds for new aircraft to fly new routes.

The demise of Braniff and Laker stand as an awful warning to industry managers of the dangers of over-investing in capacity in the hope of capturing the traffic to pay for it.

The recovery in the airline business is still very fragile. Much depends on the general recovery in the general economic cycle in the U.S.—given that airline customers are mostly business travellers. Should the U.S. recession be slower than expected in turning round—and recovery has been postponed several times, then some major airline names could be back in trouble quite quickly.

Also unsettling the future for the

industry, and therefore for the aircraft builders, is the outlook for world oil prices. The fall in prices in the early part of the year was a major factor in improving airline costings, and any reversal of the trend would have the same effect on the opposite side of the scale.

But on the labour front, the airlines appear to have more factors in their favour. The failure of the air controllers' strike is likely to have repercussions well beyond the specific wage claim involved.

Most airlines are seeking widespread changes in manning levels as well as pay structures. Once again, Braniff's collapse played an important role as well—by leaving many highly qualified airline staff looking for work outside the industry—fast food franchising seems to be a favourite.

The analysis of the industry tend to be in two minds. On the income side, passenger revenues now look more secure than a year ago, and on the cost side, both oil and wages seem to be going in the right direction—for the airlines, that is.

But competition is still fierce, especially around Dallas, where the Braniff traffic is up for grabs, and any serious

those companies already well into the more directly military defence budgets. It will also bring growth to the Space Shuttle consortia which include such names as Aetna Life and IBM.

Some of the military spin off has already shown itself in the shape of \$24m and \$47m modifications to Cape Canaveral and Mission Control at Houston respectively, for the increased security required by the Defence Department.

The outcome of the Senate's vote last June on the National Budget is expected to be a rise of 31 per cent in military procurement spending in the current year. The budget authority figure for defence may reach \$218bn this year, and rise to \$252bn in 1983.

Lockheed, which has become a purely military contractor since it discontinued the L-1011 commercial aircraft, is well placed in defence by virtue of its monopoly of construction of the intercontinental ballistic missile in its sea-launched form.

It is also strongly placed in overseas military sales, which are a likely area for further expansion. With these programmes still active, Lockheed is unlikely to suffer from the Senate's opposition to the C-5 project.

A major growth area for military aerospace lies in the field of aircraft electronics surveillance where the Middle Eastern and South American countries are keen buyers. The Sikorsky Helicopter, made by United Technologies, and the aircraft surveillance systems sold in Europe by the smaller U.S. defence companies are proving increasingly attractive to countries not necessarily in the big financial league.

This trend has been strengthened by the Argentine conflict which showed only too clearly the effects of such relatively cheap equipment as radar surveillance and heat seeking missiles on large targets such as warships.

Defence spending should ensure a firm future for the aerospace industry this year and for some years ahead. The benefits may not be spread equally throughout the industry, but few of the major companies will be without a share of the take. The smaller electronics defence manufacturers, like Loral of New York, or Wyman-Gordon or Hexcel, all with major shares in specialised markets, may outshine some of the better-known names.

If orders from the commercial airlines also take off in the mid-eighties, and there certainly is an "if" in the case just now, then there could be some spectacular gains by such companies as McDonnell Douglas with a foot in both camps.

Terry Byland

UNITED STATES

downturn in business could bring more grief. Whatever happens, the airlines are not likely to borrow money to buy aircraft if they can possibly manage without them.

Unfortunately, order books for new commercial aircraft are already looking thin. Pan American, for instance, has nothing scheduled for delivery next year, and neither has Continental, which is now effectively merged with Texas Air.

Both Eastern Airlines and Delta have orders in the pipelines for Boeing 727s and 737s, but the rest of the picture is rather bleak. In 1984 and beyond, the order books appear stronger.

But turning to the opportunities for military sales, the outlook is much more favourable. The success of the Space Shuttle testing in May was of dual significance to the aerospace industry.

The likely benefits of the \$6bn budget of the National Aeronautics and Space Administration for space-related activities have been well discounted inside the aerospace industry. But the latest good news is that the Defence Department's budget for similar activities now exceeds NASA's at \$8bn, and is still climbing.

Future space missions will be well backed by defence spending and this will clearly increase the flow of dollars to

Sector still fairly buoyant

FRANCE

AIRBUS, Mirage, Exocet. These three magic words alone are enough to conjure up the recent success story of France's aerospace business. For all the problems hitting airlines these days, the mood among French manufacturers is still fairly buoyant.

With a growth rate of some 10 per cent in real terms to show for last year, aerospace is one of the rare industrial sectors in France to have continued being a source of increased employment. Foreign orders rose by 30 per cent in 1981, and exports—mostly military—make up more than half of total turnover.

Aérospatiale, the biggest manufacturer, has taken over from Renault as the profit-making showpiece of the French nationalised sector.

While the ill-fated adventure of Concorde comes to its close, new status symbols have arrived to replace it: the first French cosmonaut, who took part in the three-man Soyuz T6 mission earlier this summer, and, next

month, the first commercial launching of the largely French-backed rocket Ariane, Europe's rival to the Space Shuttle.

But this sunny picture has come to be overshadowed by some big questions. First among these is the impact of the depression in civil aviation, coming at a time when the French authorities would like to see the military side of the sector playing a less preponderant part.

In the co-operative programmes which have been given both to Airbus and Ariane, there is the question of the next generations, still to be solved.

There is the question, too, of whether the momentum of European collaboration can be regained; Gen Jacques Mitterrand, Aérospatiale's chairman and head of the industry association Gifas, has expressed concern about the lack of new programmes.

Finally—another issue raised by Gen Mitterrand, as a challenge to his elder brother in the Elysée Palace—there is the question of whether French manufacturers can remain competitive.

The State's role in the industry has been considerably reinforced since the Socialist took power last year, with its share in Dassault-Breguet being increased to a majority and Matra, the missile specialist, as well as the Thomson-CSF communications group, being brought under state control.

More recently, Aérospatiale has been given the senior role in a regrouping of equipment suppliers. The private-sector Couzet and the public-sector SENA were concerned in two previous link-up plans in the last 10 years, but neither of them came off.

Under the new plan, backed by the Ministry of Defence, Aérospatiale emerges with the controlling shareholding in SENA—keeping it in the public domain—and almost 30 per cent of Couzet.

Aérospatiale's sales of FFf 16.5bn (\$2.4bn) last year accounted for 38 per cent of the whole industry's turnover. With its order book now amounting to almost three times that sales figure, a further big increase is expected this year, and the company is confident of staying in profit.

But not everything is rosy. Its highly successful helicopter division, for one, is especially vulnerable, since it exports 50 per cent of its production and relies heavily on the U.S. market.

One new civil aircraft project is already on the rails, the 42-10-49-seater "ATR 42," a high-wing turboprop being developed with Aérospatiale.

First deliveries are scheduled for late 1985, and half a dozen companies have already placed provisional orders, including three from the U.S.

A decision on the next Airbus, which the French partner had hoped for by the summer, is still being awaited, however. The wide-bodied Airbus—the A300, already in service and going flash tests has made big inroads into non-U.S. markets and the venture appears to be well on its way towards paying for itself.

But much will hang on timing the launch of the 150-seat A320, the short-medium range aircraft which has become the priority project at

CONTINUED ON NEXT PAGE

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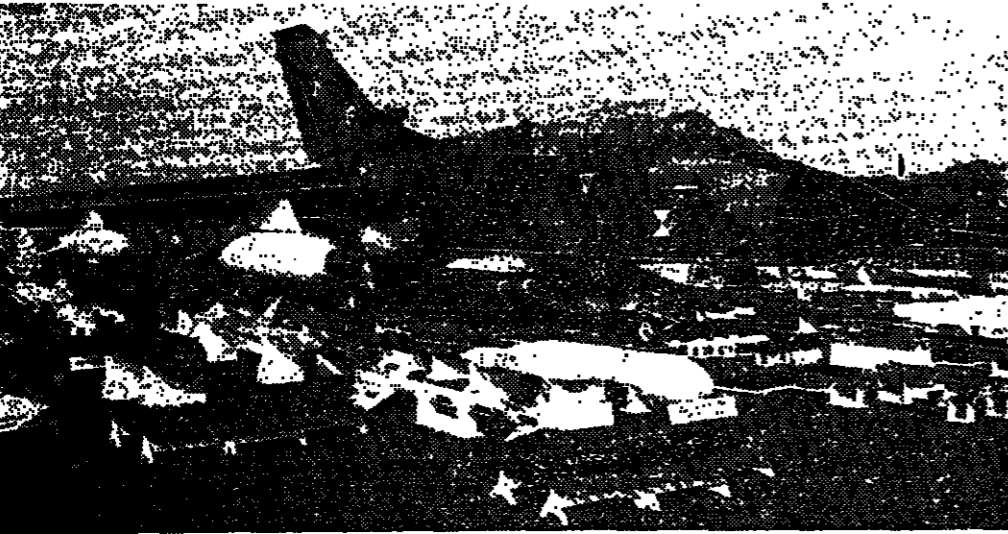
27 aircraft for nine operators in seven countries, and production is currently running at two aircraft a month...

with market developments, and a Series 300 version could emerge in the not too distant future.

BRITAIN

years—and in order to keep factories fully employed through the 1990s, the industry must start planning now.

When the recession ends, there is likely to be a flood of demand for these modern, more fuel-efficient and advanced technology aircraft...



The Anglo-West German-Italian Tornado multi-role combat aircraft (above) is now in full production for the three countries...

Greater emphasis on self-reliance

LIKE ITS counterparts in Western Europe, the West German aerospace industry is passing through a difficult period...

not likely to be filled by government cash. As a result, the industry is turning its mind to ventures that it can support substantially by itself...

The problems facing the industry are highlighted by the fact that Messerschmitt-Bölkow-Blöhm, which last year absorbed Vereinigte Flugtechnische Werke...

France CONTINUED FROM PREVIOUS PAGE

Airbus, to meet fleet renewal needs and to compete with Boeing in this potentially huge market.

The in-service date of 1986 which the company originally had in mind now has to be reconsidered. But progress has been made on putting together a new consortium...

For Dassault-Breguet, which had a less impressive profit record last year despite a 16 per cent increase in sales to FFf 12.5bn, a lot depends on the success of the new Mirage 2000, the latest in the line.

The company's Falcon business jets helped to take up the slack last year when military sales were slow but this year the civil side of the business is expected to do less well.

The 2000, a multi-role delta-wing fighter due to be produced in single-seater and two-seater versions, is to be ready for delivery from next year. Two important export deals have already been clinched...

reference for the U.S. F-16—much to the annoyance of French officials.

The manufacturer is to put more muscle into the aircraft by fitting it with a more powerful version of the Snecma M53 engine.

The state-sector Snecma, which had consolidated 1981 sales of FFf 6.4bn, still relies on military orders for more than three-quarters of its engine sales, even though its civil orders—boosted through its joint venture with General Electric of the U.S., CFM International—practically doubled last year.

Overall, the industry's exports are almost two-thirds military, and it relies heavily on France's own defence spending programme.

After the Socialists came to power there was talk of correcting the balance and keeping the military side at 50 per cent, through new passenger aircraft projects and development of space activities.

David White

WEST GERMANY

partly on how much cash the Government will be prepared to inject into the venture.

According to Mr Bernard Lathiere, president of Airbus Industrie, the A-320 is already "over-subscribed" with enough potential participants to build at least 130 per cent of the aircraft...

Government's view is that while it favours continued support for the Airbus, the industry must earn that support by becoming more cost-effective in its activities.

Another new venture still under consideration is the next generation European Tactical Combat Aircraft. It is now clear that, at a time when the Tornado production line in West Germany has been slowed from 60 to 42 aircraft a year...

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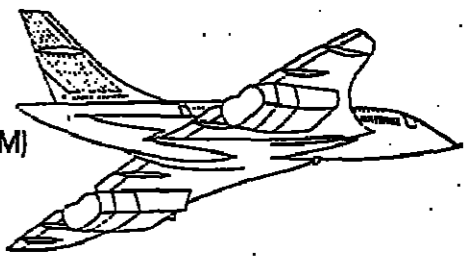
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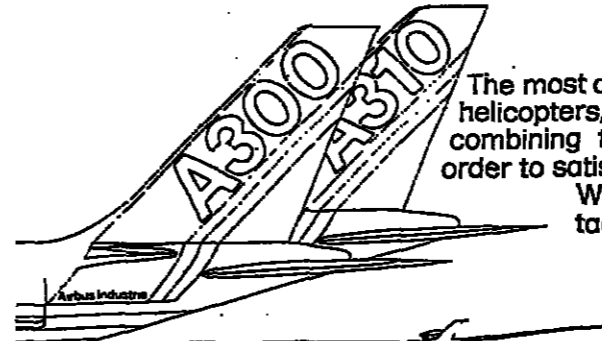
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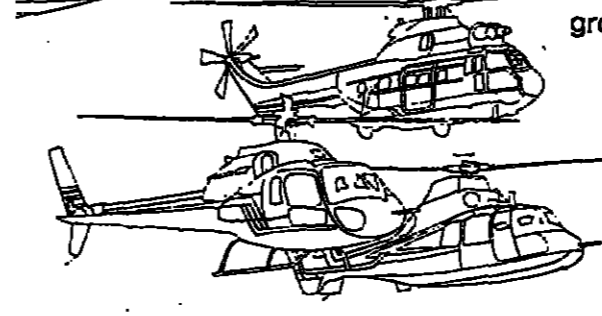
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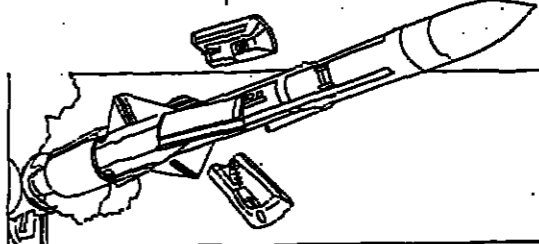
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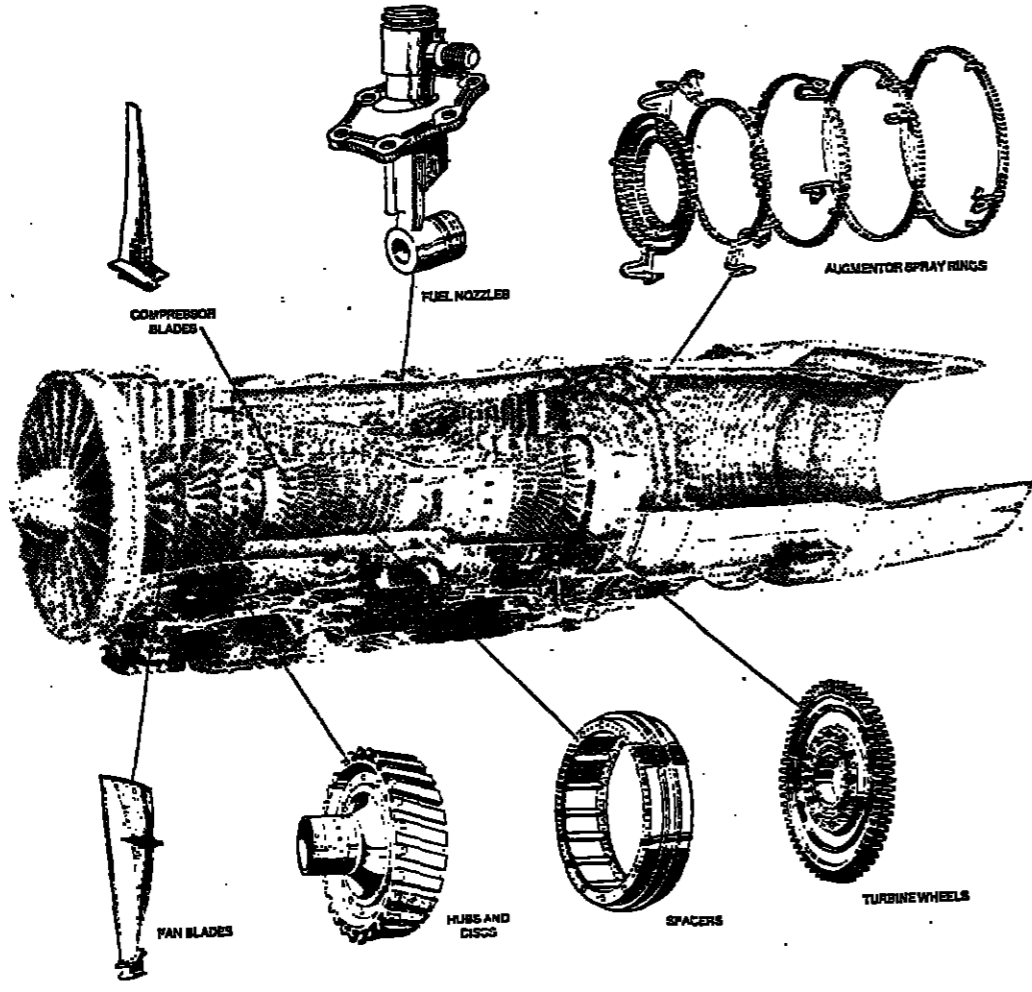
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Hobbled by financial restraints

FINANCIAL constraints have hobbled the Dutch aerospace industry very much down to earth this year. Less than 12 months ago, Fokker had seemed on the verge of re-emerging as a leading power in world aviation. Today, while it is ticking over profitably and comfortably, its ambitions have been curbed and the talk is of consolidation rather than the great leap forward.

What caused the change was, of course, the abrupt dissolution of Fokker's links with McDonnell Douglas of the U.S., which was to have resulted in joint production of the MDF-100, a new 150-seat, short-to-medium-haul airliner. The break-up hurt. Now, while casting around for new partners, the company—which likes to project itself as "aircraft maker to the world"—is seeking, basically, to improve its existing product range. A respectable year's profit is expected, to add to last year's figure of Fl 10.8m, but thoughts of an early bonanza have vanished. In 1982, sales of the highly successful F-27 and F-28 airliners are still what count, together with valuable spares and assembly of American-designed F-16 fighters.

Elsewhere, Hollandische Signaalapparaten of Hengelo, continues to engage in the European space-race through its involvement in the Eros satellite programme, and a growing number of small engineering companies have joined the Netherlands Aerospace Group, a consortium which competes actively for business in the sub-contracting market. Fokker, though, remains the clear number one in its field. Without this once-great manufacturer, Holland would be an aviation also-ran in the same league as Denmark or Belgium; with it, the country can claim tradition and achievement and an industry still employing more than 12,000 workers. It was in February of this year that Fokker learned that its dream of a "world" airliner had been shattered. The MDF-100 had been seen as a stepping stone back to greatness but the economic recession forced cancellation of the project. It has even been said that, by pulling out of the McDonnell Douglas venture, Fokker was unwittingly rescuing itself from the consequences of its own folly. Development costs of the MDF-100 would undoubtedly have soared far higher than the aircraft itself, and Fokker could easily have been left with 50 per cent of a mounting catastrophe. With Airbus, the potential may be smaller—shares in the consortium being already over-subscribed—but the safety margin and the scale of operations are each pitched more at Fokker's level.

NETHERLANDS

though, has been cautious and has studied the sometimes competing claims of Boeing and Airbus Industrie through the eyes of experience. Management is determined not to be rushed. Top executives and design teams are examining the possibilities and saying nothing, and in the meantime they are pressing ahead with a development programme on the F-27 and F-28 for which many manufacturers round the world would be deeply grateful. But while Fokker takes stock, it appears increasingly likely that it will finally come down in favour of joining the Airbus A-320 consortium. For one thing, it is European, and the Dutch are 100 per cent Euro-peans. For another, they would be working with companies more or less Fokker's own size and could hope, with luck and perseverance, to emerge from talks now going on with a level of participation in the new medium-haul Airbus of as much as 15 to 20 per cent.

Mr Frans Swartouw, Fokker chairman, said at the time that even keeping the venture ticking over was too costly. Everything was cancelled, and, at once, horizons were lowered.

For Fokker, it was a humiliation as well as a commercial setback. Since then, however, the company has bounced back and has recovered its nerve. The easy option would have been to look for an immediate alternative to the MDF-100. Fokker, however, can content himself with the continuing success story of the F-27, first developed in the early 1950s and still going strong in 1982. Experts say that the original F-27 and current model resemble each other in concept only—both being short to medium-haul, turbo-prop airliners. Progress down the years has been such that an aircraft coming off the assembly line this year is as up to date as any of its "newer" rivals and probably much more reliable. The image is good, and even if sales have been forced down by the recession, work continues. Well over 500 F-27s have now been produced, and the market for spares and repairs is considerable. There is no reason why sales should not reach the 1,000-mark, providing a continuing backdrop of profit against which to set plans for the future.

Today, Fokker employs some 9,700 workers, nearly 2,500 more than in 1978. To keep this workforce busy, there is stockpiling at the moment. Company spokesmen insist, however, that the risk is a calculated one and that, if previous trends are repeated, customers will eventually be found for all the aircraft produced. At the same time, the F-16 continues to be a money-maker. The 100th was delivered in June, and three months of the sophisticated fighter-bomber are currently being produced. Production of Fokker-designed carbon-fibre tail sections for the F-16 starts later this year, and carbon-fibre undercarriage doors for the A-310 Airbus are already being assembled.

For Fokker, the worst may be over. Profits could well be denting over the next few years by the continuing recession in

airliner sales. There is no reason to believe, though, that lessons have not been learned, and even the experience of working together, briefly, with McDonnell Douglas, could be put to good use with Airbus Industrie.

The other branches of Holland's aerospace industry are similarly jogging along—keeping abreast with the latest technological advances but scarcely making waves in the world market. Hollandische Signaalapparaten, which joins Fokker with Philips, is funded by the Dutch Government and is involved in helping to produce the Eros infra-red astronomical satellite for launching later this year. The new satellite should measure cosmic radiation sources 50 times better than ground-based equipment. Hollandische Signaal is also involved in research on spiral groove bearings for the European Orbital Test Satellite (OTS) and is working on improving solar battery discharge rates to prevent explosions in space. The company has supplied an advanced earth station to Peru and, through its French division, is developing parabolic antennae systems for the reception of satellite television pictures.

Funding comes from the Netherlands Agency for Aerospace, a government-sponsored body set up in 1946 to rescue Fokker and establish Philips in a new area. The agency provides cash to help in the development phase of a new project—as was the case with the MDF-100—and is rapid on of sales. Thus, while it takes a risk, it also stands to make a profit, as it has done, handsomely, from the F-27.

Walter Ellis

Mergers bring fresh life

FEW SECTORS in Italian industry are currently undergoing as rapid and sweeping a process of change as aerospace. Only a few years ago, it seemed primarily a cluster of small and medium sized companies, all of them fiercely independent and concentrating on proven, but small, niches in the overall international market.

But since 1977 its turnover has tripled, to L2,200bn (\$1.61bn) in 1981 from L740bn four years earlier. From the previous fragmentation, two broad groupings are emerging, both under the aegis of the public sector. Italian aerospace companies are now involved in projects across the entire spectrum of both the civil and military sectors. Inevitably, the industry has been a key element in the process whereby Italy has emerged as the world's fifth arms manufacturer and exporter. Foreign sales, at L1,550bn, accounted for 70 per cent of activity in 1981. But in a wider sense, innovations generated in the sector have helped maintain the country's place in the high technology, high value-added industries on which its future as a trading power will in good measure depend.

The Government, too, has been playing its part, although still not actively enough to satisfy many people within the industry. The long overdue modernisation of Italy's armed forces has helped, while aerospace will be a leading beneficiary of the L1,500bn (\$1.1bn) fund approved by Parliament earlier in 1982 to support technological development. Even so, many analysts fear that bureaucratic sloth, that perennial characteristic of official Italy, could still hamper the sector's progress—as

To seal the venture, the state-owned group has taken a 10 per cent equity stake in the Varese-based Agusta, hitherto the exclusive property of the Foresto family, and there are suggestions that the share might soon go up to 25 per cent. Like its counterparts elsewhere, the Italian industry has realised that the costs of developing a new project are today greater than any single private company can shoulder. In the meantime, deliveries are now in full swing of Macchi's MB-339 jet trainer (easily convertible into a light attack aircraft as events in the Falklands war showed to the Royal Navy's cost), both to the Italian and other foreign airforces, including Argentina's. The second hub in the industry is Agusta, now controlled by EFIM, another publicly owned concern, which will have responsibility for both helicopters and smaller aircraft. On the helicopter side there are no problems: Agusta makes a wide range of machines, both under licence from Bell, Sikorsky and Boeing of the U.S. and on its own account, as well as sharing in the planned EH-101 naval helicopter project with Britain's Westland.

However, friction has developed on the light aircraft side, with charges from Macchi that the later S-211 trainer built by Sivi-Marchetti, a subsidiary of Agusta, is a needless, direct competitor of the established MB-339. This Agusta and EFIM deny, but the rivalry between themselves and Aeritalia for supremacy in the sector is concealed. And wasteful duplication is not something that Italy, where research and development spending still lags behind that of its competitor countries, can afford. But efforts are under way to secure a truce.

Already the relentless pressure for new capital has obliged the Agusta family to run down its stake in the company from 49 per cent to 20 per cent after a capital increase in 1981.

It is now becoming clear that Count Corrado Agusta would like to dispose of the remaining interest, and some pressure is being exerted on Finmeccanica to step forward as buyer. Joint FFIM/IRI ownership of Agusta would neatly symbolise a new, co-ordinated approach by the State sector to the problems of Italian aerospace. But Finmeccanica is understandably wary about paying dearly for a minority stake, which could still prevent it from exerting real control in the running of the company.

Even so, these difficulties have thus far not fatally impeded the industry's advance. Employment rose a further 2 per cent last year to 42,000, in sharp contrast to the squeeze on jobs in most of the rest of Italian manufacturing industry. Investments in 1981 doubled from 12 months earlier to L370bn (271m), and the medium and longer term outlook for the aerospace sector remains distinctly healthy.

Rupert Coriwell

Missing flypast tells story

BELGIUM'S national day on July 21 neatly summed up the declining fortunes of aviation in the country. For the first time in many years the pomp of military march-past in central Brussels was not crowned by a fly-past overhead.

By some estimates Belgium's air force pilots are currently flying only 36 training hours a year as against the Nato level pledged of 240 hours. Although that perfunctory poor performance is a result of public spending cuts, it also reflects all too accurately the state of the aircraft industry.

Ironically, it has been Belgium's part in the construction of these virtually grounded military aircraft that has kept its handful of aircraft specialists in business since the World War II. The mounting cost of aviation fuel and the stringent budgetary disciplines being imposed by the Belgian Government to reduce the running state deficit are certainly reducing the operational effectiveness of the air force, yet it is Belgium's participation in the F-16 combat aircraft fighter that guarantees the survival for the present of the country's three leading aviation concerns.

The two major aerospace constructors, SABCA and Sonaca, rely far more than half their turnover on sub-contracts resulting from Belgium's share in the

programme is at present firmly in the hands of the Belairbus grouping that is dominated by the State-controlled Sonaca.

Flag's demands have provoked anger and consternation in Wallonia, where the aircraft industry, small as it is, is seen as one of the few high technology rays of hope in an economically battered region that is otherwise grappling with the decline of steel and heavy engineering. Flag's disruptive effects, for it undoubtedly has political clout out of proportion to its technical expertise and experience, are likely to be compounded by the present state of the Belgian industry.

Since World War II the sector has slid from being an industry in its own right, with a strong innovative lead in light and training aircraft, to the status of client industry with little other function than to produce the domestic content of foreign aircraft bought by Belgium's air force or the State-owned airline Sabena. At the same time major foreign interests have bought in, so that the leading SABCA company, founded along with Sabena in 1923 as a cornerstone of Belgian aviation, is now 50 per cent owned by France's Dassault-Breguet.

That particular relationship has of late greatly complicated the reaching of a decision inside the Belgian Government on a successor to the air force's French-built Mirage V tactical strike aircraft. The choice appears to have settled on the F-16 once again—which will ensure that the local contracts on those ordered to replace the Lockheed F104G do not run out in 1984—at the expense of the new-generation Mirages that had been urged by Dassault-Breguet along with the Dassault-Dornier Franco-German Alpha-Jet already in limited use in Belgium for advanced training.

The details of the F-16 "second wave" orders are still being worked out by the Belgian Government, with the object of securing both attractive financial terms for what could be up to 100 fighter aircraft and a substantial share of their construction. A sizeable proportion of that work seems destined to be placed with the burgeoning Flemish aerospace industry, thus raising fresh doubts as to the longer term future of the Walloon sector. For even with its present lion's share of F-16 contracts and works on the Airbus, Wallonia is finding itself forced to give heavy subsidies to the aircraft companies there. The comparatively recently established regional government has lately, after much deliberation, decided to subscribe some BFr 1.1bn of Sonaca's start-up costs for the Airbus, which could total BFr 4.8bn.

Giles Merritt

BELGIUM

building of the U.S. General Dynamics fighter selected in 1975 by a number of European countries in what was known as "the sale of the century". In Belgium the F-16 replaces the ageing Lockheed F-104G Starfighter and the aircraft engines division of Fabrique Nationale Herstal depends to the tune of 75 per cent of activity on its part in the building of the aircraft's FR-100 Pratt and Whitney engines.

The fact that these three main aviation companies, with their 7,000 or so key technical jobs, are grouped in the French-speaking southern Walloon region of Belgium has of late roused fierce resentment in Dutch-speaking Flanders. Some 90 small and medium-sized Flemish engineering concerns have rallied behind such larger groups at Bekaert to form the controversial "Flag" consortium that is demanding a major stake in future aviation contracts. Flag, for Flemish Aerospace Group—is attempting to break Wallonia's longstanding dominance of the aircraft sector by insisting that in future it should receive 56 per cent of all the work carried out in Belgium not only on the F-16 but also on the A-310 Airbus, even though Belgium's related involvement in the Airbus Industrie pro-

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Boost from new military contract

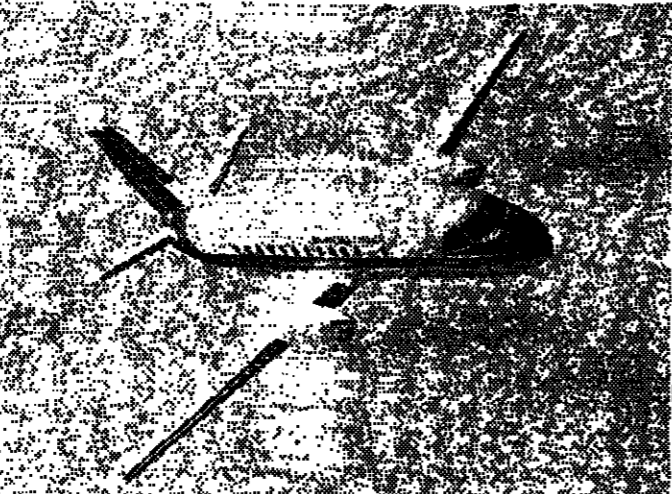
SWEDEN'S aerospace industry is basking in a far more buoyant climate these days. After three years of doubts about its future and with its very survival at stake the industry has recovered its self-confidence; new staff are being recruited and a sense of purpose has returned to the design rooms and workshops.

The most important single factor for this change of mood was the signing on June 30 last of the contract under which the all-Swedish industrial group led by Saab-Scania will build a new multi-role combat aircraft for the Swedish Air Force. Other bullish features are the speed at which Saab's joint airliner project with Fairchild of the U.S. is going ahead and the extension of the missile programme.

The order for the new combat aircraft, code-named JAS, covers development and production of an initial batch of 30 aircraft. The contract is valued at about SKr 10bn (940m), with about two-thirds of the work being carried out by Saab-Scania. The rest is divided among Volvo Flygmotorer, the Ericsson Telecommunications group which will be responsible for the pulse doppler radar equipment, SRA Communications and FFV, the state-owned defence equipment manufacturer.

The full JAS programme approved by the Riksdag (Parliament) calls for the delivery to the Air Force of 140 aircraft with weapons and other equipment by the year 2000 at a cost of SKr 25.7bn in 1981 prices. By choosing the JAS and discarding competing offers from American manufacturers, the Swedish Government and Parliament are estimated to have saved 6,000 of the 13,000 jobs within the Swedish aerospace industry. In particular, Saab-Scania's capacity to design its own aircraft has been preserved.

The decision to go ahead with the JAS was pushed through Parliament by the non-Socialist parties against the opposition of the Social Democrats who are well placed to win the general election in September and return to power. The Social Democrats did not object to the contract itself but they wanted to postpone the de-



The Saab-Fairchild 340 commuter airliner, now in production, is a joint venture by Saab-Scania of Sweden and Fairchild Industries of the U.S.

cision for another year to allow time for further assessment of the economic and technical content of the package offered. The Social Democrats' attitude has been influenced by the doubts expressed by the Army commander General Nils Skold whether the JAS design has the development potential to remain competitive through its estimated lifetime, which will extend well into the next century.

The Air Force does not share the Army chief's reservations and the Social Democrats are not expected to cancel the JAS order if they are voted back

SWEDEN

into office in September. The contract signed in June provides for substantial penalty payments to the contracting group in the event of a cancellation.

It also includes penalties payable by the contractors if they fail to meet the specifications, which cover not only the aircraft's performance but also the cost of operating and maintaining it. Aiming at avoiding the cost overruns experienced in developing and building the Saab Viggen, the aircraft currently serving with the Air

Force, the contract significantly increases the risks carried by the contractors. Saab-Scania emphasises that the JAS will be the first true multi-role aircraft, of which one version will perform intercept attack and reconnaissance missions. Like its predecessors, the Viggen and the Draken, it is designed to fit the special Swedish air defence profile which calls for planes able to operate from ordinary roads and under a simple turnaround service handled mainly by conscripts.

At a take-off weight of around eight tonnes the JAS will be roughly half the weight of the Viggen but will possess a weapons-carrying capability of the same order as its predecessor.

On the same day that the JAS contract was formally completed the Swedish Defence Procurement Board also placed a SKr 500m order with the Saab Bofors Missile Corporation, owned jointly by Saab-Scania and the Bofors armaments company, for an Air Force version of the RBS 15 missile currently under development for the Swedish Navy.

This brings to SKr 1.1bn the value of the contracts so far reached for the RBS 15. It is a sea-skimming anti-ship weapon similar to the French Exocet, used by Argentina in the Falklands conflict. The only major

foreign component in the missile will be the jet engine, which will be bought from France's Micro Turbo.

The RBS 15 will have a longer range than Exocet. According to reports in the Swedish Press its target-seeking equipment will be less vulnerable to interference than that of Exocet and will have a ground-hugging capability, enabling it to be used within the island belts around the Swedish coast.

Saab-Scania's target is to reduce its dependence on Swedish military contracts and to reach a balance between military and civil work by the end of this decade. The principal component in this strategy on the civil side is the 34-seat airliner the SF340, which it is building together with Fairchild Industries of the U.S.

So far development of this aircraft is on schedule. On August 3 at Saab's Linköping plant, the wings built by Fairchild in the U.S. were mated with the fuselage of the first aircraft, which is scheduled to roll out late in October next. The first flight will take place early in 1983 and the first deliveries are planned to reach customers in the first quarter of 1984.

Saab-Scania and Fairchild report 111 firm orders and paid options for the SF 340, which is aimed at the growing short-haul regional airline market. They estimate that the project will break even with the sale of around 200 aircraft at a price of roughly \$4.75m each in 1981 prices but they believe they have a good chance of capturing a considerably larger share of the market which could altogether amount to as much as 2,000 aircraft by the mid-1990s.

One sales point underlined at Linköping is that by virtue of its transatlantic partnership the Saab-Fairchild SF 340 will be the first airliner designed to meet both the highest U.S. civil aviation standards and the new joint European aviation regulations. But one of its biggest advantages in fighting for its market share may be the speed with which it is being brought into production.

William Dullforce

Two countries become partners...

THE SPANISH aerospace industry continues to centre round the success of the C-212 Aviocar—or "the jeep with wings" as it has become popularly known. This STOL aircraft (short take-off and landing) has become the standard-bearer of its product line, Construcción Aeronáutica (CASA) which, in turn, is the dominant force in the industry.

According to Casa a total of 330 C-212 aircraft either in civilian or military versions have been ordered and 215 are currently operational. Sales last year alone totalled 65 with new markets in Australia and the Emirates with a further breakthrough in all important North American markets, where 26 were sold. Aviocar orders assure Casa work to 1985.

Casa is also bidding for a major contract with India to supply 300 Sual aircraft, offering the C-212. This would be a major advance and open Casa's horizons even further.

The Aviocar can carry up to 28 passengers or loads of 23 tonnes, with a wide variety of civil and military uses. The aircraft has done especially well on the military side and Casa is now stressing recent studies which have shown that peacetime use of larger military transports is well below capacity.

The argument now advanced is that it is cheaper and more efficient to utilise smaller aircraft of the Aviocar type rather

than, say, the Lockheed Hercules.

Work is now at an advanced stage on the production of an upgraded version of the Aviocar, the CN-235. This will be able to carry up to 40 passengers using a different and more powerful engine, the General Electric CT7-7 against the Aviocar Garrett TPE-331. The potential market for such an aircraft is believed to be

SPAIN

1,800 civilian units over the next 10 years, with a further 600 on the military side.

There is going to be tough competition from at least three other international groups. Casa feels it has acquired client loyalty as a result of the C-212 and it has made an important move to secure a foothold in the Asian market.

The company has signed a joint production deal with the Indonesian National Aircraft Company for the CN-235. The latter is already assembling the Aviocar and some 40 Spanish engineers are now working in Indonesia on the new project.

Casa, founded in 1923, is 69 per cent controlled by the state holding company, INI. Although one of the smaller European aerospace companies, it has been remarkably successful largely because it has carefully

defined its objectives. Lacking a broad technological base and possessing limited funds, Casa has confined itself to filling the holes left by the major companies in the aerospace sector. One of the holes left by the big companies concerns adaptation of technology. Here Casa—which also has as partners Northrop (13 per cent), MBB of West Germany, (11 per cent) and Avions Marcel Dassault of France, (0.6 per cent)—believes that it can play a role adapting advanced technology to less sophisticated needs.

Casa also plays an important role as sub-contractor on a number of aircraft programmes. For instance, it makes horizontal stabilisers and passenger doors for the Airbus A-300 (it is also a member of Airbus Industrie); it supplies parts for the Mirage F-1 and for the Falcon executive jet, both produced by Dassault. The company also works with Boeing on the 727 and the 737 airliners, with McDonnell Douglas on the DC-10 and Canadair on the L215 programme, in addition to producing the Bo-105 helicopter with MBB.

On the national defence side, Casa has developed and produced a jet trainer for the Spanish Air Force—the C-101. So far, four of these two-seat trainers have been delivered

and 100 ordered. Casa has high hopes of securing export orders for the trainer, especially in Latin America.

The company has a contract with the Defence Ministry for repair and maintenance of aircraft and also does some maintenance work for the United States Air Force on Phantom F-4 aircraft and their engines.

The most significant aerospace deal in years, however, has been the recent decision by the Spanish Government to select the U.S. McDonnell-Douglas F/A-18 Hornet fighter for the Spanish Air Force. Up to 84 aircraft will be bought, worth about \$3bn.

The deal — the details of which are now being discussed — will involve a substantial volume of industrial offset activity for the Spanish aerospace industry, including manufacture of components, the transfer to Spanish industry of U.S. aeronautical technology, provision for in-service maintenance and other support for the Hornet.

The deal also includes procurement of the U.S. General Electric P-404 turbo-fan engines to power the F/A-18 aircraft. A total of about 180 engines will be provided by General Electric for the new Spanish Air Force fighter between 1985 and 1988. The first Spanish F/A-18 is to be delivered in January 1986.

Robert Graham

...in joint "flying jeep" development

INDONESIA'S aerospace industry revolves around the personality of the Minister for Research and Development, Dr B. J. Habibie, and on the hopes placed on a new generation STOL (short take-off and landing) commuter freighter, the CN-235, which is being produced by an Indonesian-Spanish consortium.

Dr Habibie is also the President of Indonesia's public aerospace company, P. T. Nurtanio, and executives of Spain's CASA, Nurtanio's partner in the CN-235 project, speak of him in terms approaching reverence.

A hand-picked, bright-boy sent to study abroad, Dr Habibie gained a doctorate in aeronautical engineering in West Germany and joined MBB where he rose to become vice-president. He returned to Indonesia convinced that technological advance was the key to development and national independence.

His creation of Nurtanio, in the wake of the 1973 oil take-off, and under the umbrella of Pertamina, the state oil company, was a practical expression of his development theories. CASA executives see Dr Habibie almost as a renaissance figure equally at home in the worlds of advanced science, develop-

mental politics and complex administration.

After experimenting with the manufacture of a light Polish aircraft for agricultural use, Dr Habibie narrowed Indonesia's aerospace industry requirements down to co-operation, initially with his former company MBB, for the manufacture of the light, tactical BO-105 helicopter and later sought an agreement with Aerospatiale of France for the manufacture

INDONESIA

of the robust Puma range of helicopters. In the fixed-wing sector, Dr Habibie's choice of a Nurtanio partner was Spain's Casa.

A first Indonesian contract for eight C-212 Aviocars in 1975 was followed by four further orders of 20 aircraft each with an upgrade of Indonesian participation in each order. The current 20 units of the fourth order are 85 per cent manufactured in Indonesia.

Casa executives attribute their relationship with Indonesia as much to the versatile, sturdy qualities of the "jeep with wings" as to the flexible

nature of the Spanish company itself.

Both Spain and Indonesia found fertile common ground in the department of intermediate technology and of a national aerospace industry. The first born of the marriage of interest is due in October, 1983, when the CN-235 is scheduled to make its maiden flight. Essentially, the 34-seat, high-wing, turbo-prop CN-235 is the child of the Aviocar, and shares the basic characteristics of its parent. It aims to be cheap both on fuel and maintenance, and is projected to be both tough, with a landing gear designed for semi-prepared air-

fields, and adaptable for both passengers and cargo. Its maximum cabin diameter is a spacious 2.7 metres, and it incorporates a wide central door and cargo ramp. The aircraft will be powered by two CT7-7 engines and uses Messier Hispano-Bugatti landing gear.

The CN-235 is the result of a 50-50 Indonesian-Spanish shared basis project and \$50m has been sunk into its development and the construction of its two prototypes. Commercial feasibility studies estimate a civil market for the aircraft of 1,800 units for the 1984-94

period, in addition to a further 600 adapted for military use.

Indonesia has placed orders for 54 units and Spain for 20. The test for the new aircraft inevitably depends on the American market for which the feasibility studies allocate 40-45 per cent of the estimate. The CN-235 backers believe that CASA has already achieved something of a breakthrough in America, having found five civil U.S. buyers for the Aviocar.

Production of the new aircraft aims to boost the present 6,000 employed in Indonesia's aerospace industry to a workforce of 10,000 by 1986 and to consolidate for Nurtanio an unchallenged position in South East Asia.

The conditions for such pre-eminence are already well-established at Bandung where factories Nurtanio One and Nurtanio Two (earmarked for the CN-235) constitute what foreign associates claim is an outstanding modern conception of facilities for an aerospace industry. In keeping with Dr Habibie's background and beliefs, research and development facilities occupy pride of place in the complex.

Tom Burns

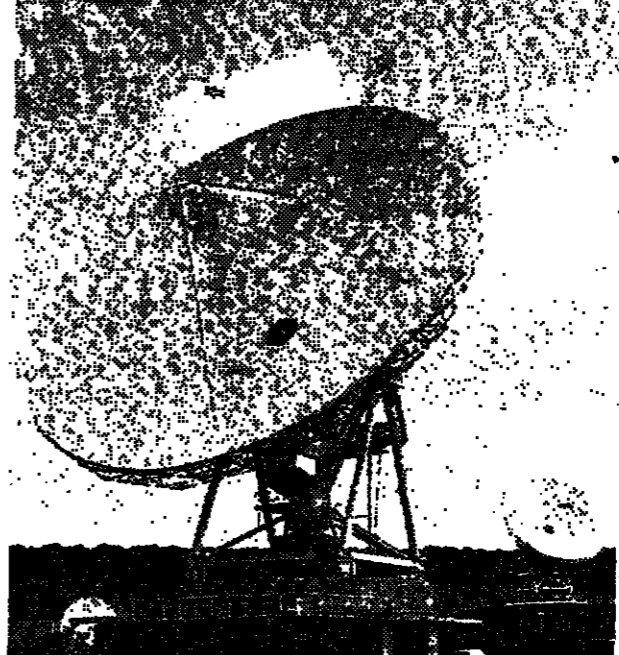
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One of the most vigorous industries in the Developing World

THE BRAZILIAN aerospace industry is one of the most vigorous in the Developing World. It has already made a major contribution to world air transport with a range of small and medium-sized airliners and military trainers, and is also expanding its interests into the field of more advanced combat aircraft.

The principal manufacturer is Embraer, based at Sao Jose dos Campos in Sao Paulo State, and employing about 6,000 workers. Although it was set up only in 1969, and came into operation in 1970, it has quickly established a high reputation with overseas customers for civil and military aircraft.

owns 51 per cent of the voting shares of Embraer, but the rest is in the hands of private investors. By the end of 1981, Embraer had built well over 2,500 aircraft of various types. The most successful civil aircraft built in Brazil is the Bandeirante (Pioneer), a twin turbo propeller airliner, seating up to 21 passengers, of which more than 400 have now been sold to operators world-wide, and especially to the "commuter" airlines in the U.S., where the aircraft has proved highly suitable for short-haul feeder operations and for linking local communities both together and with larger airports.

Embraer is also building a maritime surveillance version of the aircraft, while it is also in service with various foreign air forces. Following the Bandeirante, Embraer is now developing the larger 30-seat twin-engined

tion in this market. Embraer has built a major reputation with its Bandeirante, and is hoping to follow that with an even bigger success in the Brazilia.

performance of the aircraft, and has placed a firm order for 168 aircraft. Production tooling is building up to provide for first deliveries at the beginning of next year. For the longer-term future, work is now under way at Embraer, jointly with Aeritalia and Aeromacchi of Italy on the AMX, a sub-sonic single-seat, single-engine combat aircraft to replace the Fiat G-91 and Lockheed F-104 fighters in the Italian Air Force. The Brazilian Air Force is also developing a new version of the AMX type of aircraft. The first flight of this new version is scheduled for next year.

Michael Donne

Good opportunities for foreign manufacturers

SINCE its purchase several years ago of three Boeing 747 Special Performance Jumbo jets, China has done little further to upgrade its aged fleet of passenger aircraft, many of which are Russian-built.

As well as the 737-200 Twin-jets, China is known to be looking at various wide-bodied aircraft, and is having discussions with several U.S. and European manufacturers, notably Boeing, McDonnell Douglas, Lockheed of the U.S. and Aerospaziale of France.



The prototype 17-passenger twin-engined Y-11T transport aircraft, built at Harbin in China. DK Aviation of the UK will be responsible for world-wide marketing, through a company to be set up in conjunction with the China Trade Centre. The Y-11T is a no-frills, five-ton, high-wing aircraft with a fixed undercarriage, intended for a wide range of transport and other duties.

China has attempted to build a supersonic aircraft of its own, driven by Rolls-Royce Spey engines, but it has either cancelled for the time being or abandoned the project altogether.

China has attempted to build a supersonic aircraft of its own, driven by Rolls-Royce Spey engines, but it has either cancelled for the time being or abandoned the project altogether.

CHINA

modernising its airline, known as the Civil Aviation Administration of China (CAAC). Boeing has been most active in seeking to drum up aircraft sales in China and probably has the inside running if and when the Chinese decide to replace some of their ageing Soviet-built Ilyushins and Antonovs.

China is known to be particularly interested in Boeing's 737-200 Twin-jet which can carry about 115 passengers and is both economic and versatile. The backbone of China's international fleet are 10 Boeing 707's bought in the early 1970s.

JAPAN

JAPAN HAS a moderate but steadily growing aerospace industry. It does not produce thousands of Mitsubishi and Kawasaki like the Toyotas and the Daimlers that are the world's largest car and truck makers.

JAPAN

Companies has 133 members. The Japanese admit that there is a technology lag. In the Boeing 787 project, they have been entrusted only with production of body sections.

JAPAN

Imports of aircraft and parts in calendar 1981 came to Y355bn or \$1.4bn. Aircraft alone, mainly for the airlines, totalled Y214.9bn or \$859.2m.

JAPAN

The Japanese began licensing production of trainers, fighters and helicopters with the establishment of the Self-Defense Force in 1954.

Moves to overcome technology lag

Most of the Mitsubishi are sold in the U.S. Of the 110 MU-300s on order, 100 are for the American market, the remainder go to such countries as Venezuela and the UK. Of the 711 Mitsubishi produced thus far, only 70 are in Japan.

Japan is also involved in development of a prototype engine jointly with Britain's Rolls-Royce, subsidised equally by the Japanese and British governments.

Both Boeing and Airbus Industries want to build a new airliner in partnership with Japan but on their own terms. Japan wants to use the project to broaden its technological base.

Japan ranks fifth behind the U.S., France, United Kingdom and West Germany in aircraft production. The reason is the limited domestic market and the fact that constitutional restraints keep military expenditures down to 1 per cent of the GNP.

John Fujii Tokyo

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EXPANSION BY ISRAEL AIRCRAFT INDUSTRIES

The Israeli Kfir (Lion Cub) single-seat interceptor, long-range patrol fighter and ground attack aircraft, is built in Israel itself by Israel Aircraft Industries, and has demonstrated its capabilities frequently in recent years, and especially in the recent Israeli action in Lebanon.

The Kfir is being followed by a new lightweight, single-seat, air defence and ground attack fighter, called the Lavi (Young Lion), with a first flight expected in 1984, and entry into service in 1986, replacing the Israeli Air Force's A-4 Skyhawks, then the F-4 Phantom jets, and finally the Kfir itself.

Israel Aircraft Industries is a widely based aerospace group. It is also involved in civil aircraft (including manufacturing of the Arava short take-off and landing transport), the Westwind executive jet, while a new executive jet, the Astra, is under development. Other divisions are engaged in electronics activities; engineering research, design and development; aircraft servicing; and equipment and component manufacture.

مركز الأبحاث

Exports have risen dramatically

CANADA'S aerospace industry, divided about equally between Ontario and Quebec, with a sprinkling of plants further West, has begun to feel turbulence from the world recession. Those parts of the industry specialising in defence work, both components and overhaul, and in avionics and electronic systems generally, have managed to keep up volume and employment on the whole, while companies making engines and parts for the commercial aviation makers have felt a sharp down-draught.

The Canadian aerospace industry comprises about 125 companies which make aircraft, engines, airframe components, satellites, electronics systems and components, including navigation and communication systems, flight simulators, hydraulic gear and fuel systems. They are located mainly in Montreal, Toronto, Winnipeg, and Ottawa, but also in the Maritime and Western Canada. The two largest employers are: Canadair, of Montreal, which makes the Challenger business jet, a water bomber for fire-fighting, and also airframe components and defence products; and Pratt and Whitney Aircraft of Canada, the world's largest manufacturer of small turboprop and turbofan engines for the general aviation industry. De Havilland Aircraft of Canada, at Toronto, which makes the Twin Otter, the Dash Seven, and is now developing the Dash Eight, both commuter-type aircraft with Pratt and Whitney engines, is next largest. Canadian Marconi specialises in navigation systems and

avionics, and CAE Industries is a world-class producer of simulators for commercial airliners and military aircraft. A host of firms in Montreal, Toronto and elsewhere specialise in other areas of aerospace.

The industry had a volume of about \$3.3bn in 1981, even after inflation twice the level of 1976, and employment in the same period rose from 25,000 to 45,000. Exports have risen dramatically. The ratio of exports to total sales was 76 per cent in 1976 and 88 per cent in

Space Shuttle, have been costly both for individual companies and Government financial resources. Generally, the industry remains modestly profitable, but the Government, besides its direct funding of research, has guarantees outstanding for about \$1.2bn in Canadair debt to cover development and production of the Challenger. Further heavy backing has been provided to de Havilland Canada for the commuter aircraft and for engine development at Pratt and Whitney.

The two main problem areas, as a result of the recession, are Pratt and Whitney, the engine maker, and the two airframe firms, Canadair and de Havilland Canada, which are both Government-owned.

Pratt and Whitney has had to lay off around 2,000 workers as demand from the U.S. general aviation industry has plummeted nearly 50 per cent in the past year.

CANADA

1980, mainly due to engine and component work. Aerospace is Canada's only secondary manufacturing industry with a long term favourable balance of trade. Despite the impact of the present recession, sales are expected to double again by 1986, as the Challenger deliveries peak.

Mr John H. Simons, chairman of the Air Industries Association of Canada, believes that this successful record has come about because of the industry's determination to specialise, undertake more research and development with Federal Government help, take commercial and military aircraft component work, and find world markets for the Challenger wide-bodied business jet and the two de Havilland commuter aircraft.

The successes of the past decade, including the Canadian "space arm" on the American

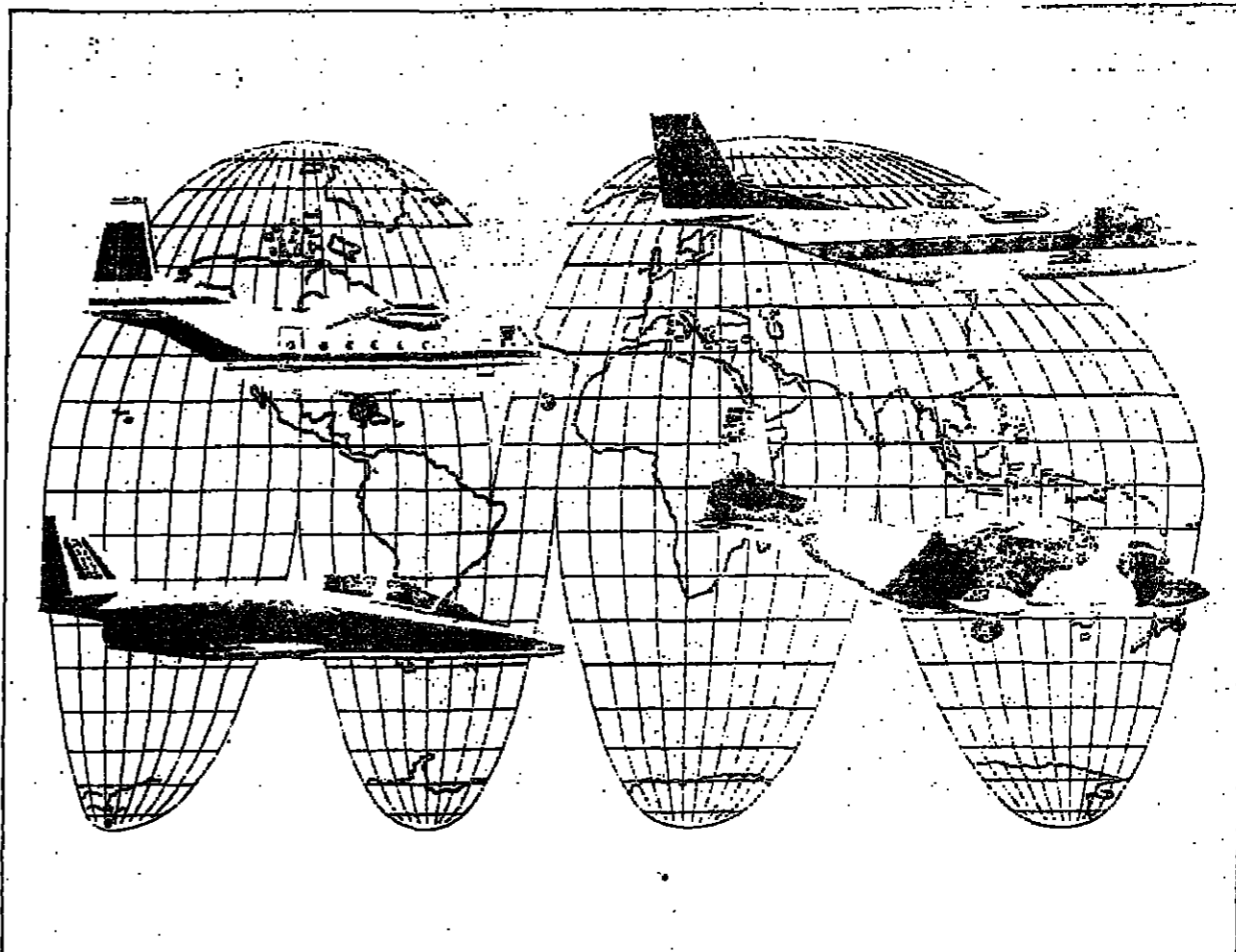
swollen to about 110, or about one-third of the way to estimated break-even, and production will start only in the fall, the four-engine Dash Seven has been a disappointment, while orders are running light for the older Twin Otter, widely used in the resource industries.

However, de Havilland Canada, with the support of the Government, has signed an understanding with Airbus Industrie of Europe to participate in development of the A-320 150-seat airliner, and to make airframe components for it. The Government would invest about \$500m in the project, and would expect to gain at least 10 per cent of the manufacturing programme with de Havilland Canada as an associate partner. The possible entry of Canada into the A-320 programme is now being hotly debated inside and outside the industry, and domestic politics are involved because the Government wants a new aircraft plant in Quebec.

No final decision on Canadian participation is likely for at least a year, because of the uncertainty whether enough of the world's airlines will be able to afford the required number of A-320s for the project to get off the ground.

Air Canada would be expected to become an A-320 customer, and it will have to replace its DC-9s at some stage. Another factor will be the future of Boeing's rival "7 Dash 7" project, and a comparable venture from McDonnell Douglas of the U.S.

Robert Gibbens

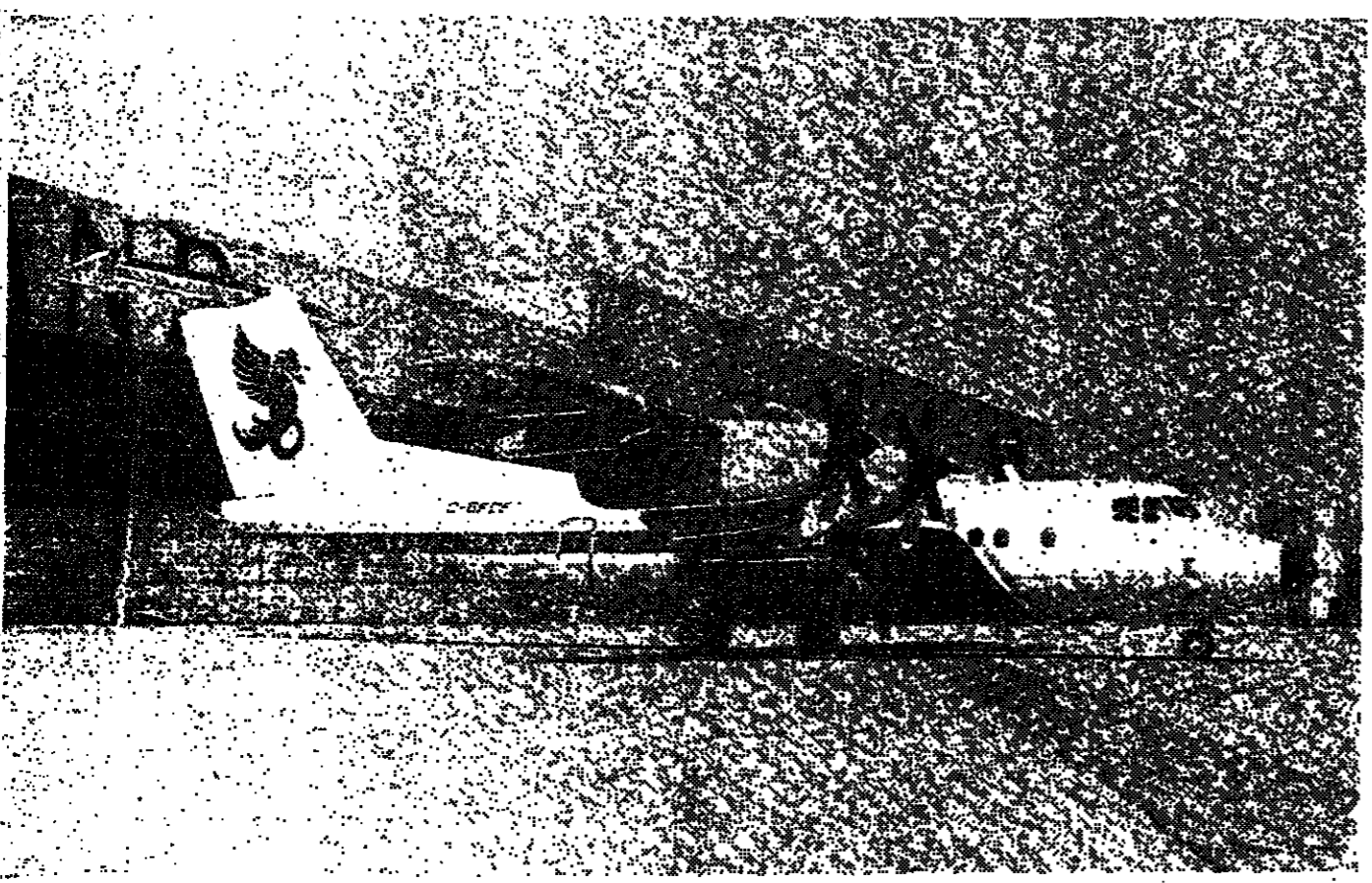


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The four turbo-prop engine de Havilland Canada Dash Seven airliner has sold widely throughout the world both as a commuter and feeder-airliner and as a general duty transport. A feature of this aircraft is its short take-off and landing capability.

Industry 'reasonably confident'

LIKE ITS counterparts elsewhere, the Australian aerospace business is at present hardly shock-block with orders. On the other hand, despite recent budget cuts, the Australian armed forces are moving into a new round of major equipment acquisitions which will keep their own capabilities reasonably abreast of international standards, and should ensure continuing relatively good levels of employment for the local aerospace industry.

In general, Australia continues to rely on overseas sources for the design and construction of most of its larger and more complex weapons systems. At the same time, much has been done to harness local industrial resources to reduce Australian dependence on overseas manufacturers for the maintenance of this equipment.

The base of the Australian aerospace industry comprises three main organisations: the Government Aircraft Factories (GAF) and the Commonwealth Aircraft Corporation (CAC), which operate side-by-side at Fisherman's Bend, in Melbourne, and Hawker de Havilland Australia, whose main base is Bankstown, Sydney. They currently employ just under 6,000—10 per cent more

than the bottom of the most recent work trough, in 1976—and have annual sales exceeding A\$150m (£88m).

Since the Defence White Paper of 1976 spelt out a policy of increased Australian defence self-reliance, the Government's aim has been to bolster the local aircraft industry so it can provide independent support for all defence aircraft. It is this maintenance support

in the main, says Hawker's commercial director, Mr Peter Smith, defence manufacturing currently consists of spares and modification kits, though in the absence of significant defence manufacturing projects over the second half of the 1970s, the Government's AIP Programme (Australian Industry Participation) has been crucial as a potential source of manufacturing work.

For example, CAC has scored impressively in its major speciality, jet engines, winning sub-contracts for engine component production from Rolls-Royce, Snecma, Pratt and Whitney, and General Electric, as well as airframe contracts from Boeing, Lockheed and McDonnell Douglas.

The main beneficiary has been Hawker, with contracts from Bell, Boeing, British Aerospace, General Electric, Lockheed, McDonnell Douglas and Pratt and Whitney.

Despite the current recession in the international aerospace and aviation industries, Mr Smith says the Australian aircraft industry is looking to the rest of the 1980s with reasonable confidence.

AUSTRALIA

role which currently provides the local industry with the greater part of its defence work. CAC currently overhauls the Snecma Atar gas turbine engine for the Royal Australian Air Force's Mirage's, as well as Rolls-Royce Avon and Viper turbojets. At GAF major maintenance activity is related to the Mirage, while Hawker de Havilland handles the maintenance work on the RAAF's Caribou aircraft, the Pilatus Porter for the Army, and Tracker, Wessex and Sea King helicopters for the Navy. In addition, Hawker has built up a substantial export business on gas turbine overhauls.

Memorandum

Recently, a memorandum of understanding was signed by de Havilland Canada, which could potentially see the Canadians taking a 10 per cent stake in the A-320. A similar memorandum, involving around 2 per cent, was signed by the Australian aerospace industry last December, but in recent weeks a more formal offer has been received.

The feeling locally is that Australia cannot afford to subsidise the A-320 programme, and while the project is readily described as one of the brightest opportunities for the industry in the second half of the decade, it is felt the Australian Government will be unwilling to take up the proposal, as currently phased, unless it specifically wants to do something about export prospects or employment potential.

Michael Thompson-Noel



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Most international airlines have incurred heavy losses in recent years and many continue to do so. Even the limited expansion now occurring in air travel is largely profitless—the revenue yield from the increased volume of traffic is not matching rising costs.

International airlines struggle for survival

DURING THE past two years, the world's scheduled airline industry has been passing through the worst economic recession in its history. The overall volume of world air travel, which through much of the 1970s showed an average annual rate of growth of about 7 per cent a year, slumped in 1980, according to the annual figures compiled by the International Civil Aviation Organisation (the technical agency of the UN). The total number of passengers at 748m was down 6m on the previous year—the first-ever fall and there was a further fall to 728m in 1981.

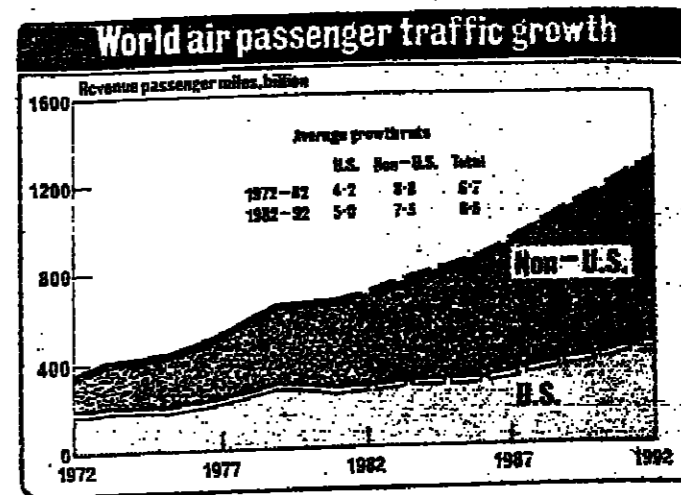
has had a far less severe impact on many airlines in the Developing World, although it has inevitably had some effect on reduced rates of traffic growth. Now, the industry is anxiously looking ahead, to see whether the recession is fading, as some observers believe. Over recent months, there have been some signs of an improvement in traffic volumes, although again this pattern has been mixed.

Overall, it seems that air travel is improving slowly, and for 1982 as a whole, there may be a small recovery from last year's ICAO figure of 728m to about 742m, a gain of just under 2 per cent. The problem confronting the airlines is that this is far too small a growth to be of much value, and that even this limited expansion is largely profitless—the revenue yield from the increased volume of traffic is not matching rising costs. Although fuel prices have stabilised in recent months, and in some cases have come down, other costs continue to rise, while the burden of interest payments on new equipment represents a serious burden. The gross revenues of the international scheduled airlines are expected to rise in 1982 from last year's \$66.3bn to about \$70bn, but this growth is expected to be largely wiped out by the rises in costs.

It has been estimated by the IATA that the losses of its 117 member-airlines for 1982 are likely to amount to \$1.57bn, likely to amount to about \$1.6bn in interest charges. This loss is likely to rise in 1983 to some \$2.1bn, after interest of \$1.73bn. According to the IATA, interest rates are now taking over from fuel as the airlines' biggest single headache. While, remarkably enough, some airlines have reported profits in 1981-82, most others are still incurring losses (and British Airways is a case in point), while some, such as Laker and Braniff, have gone out of business, and others may yet join them before the recession in the airline industry is over.

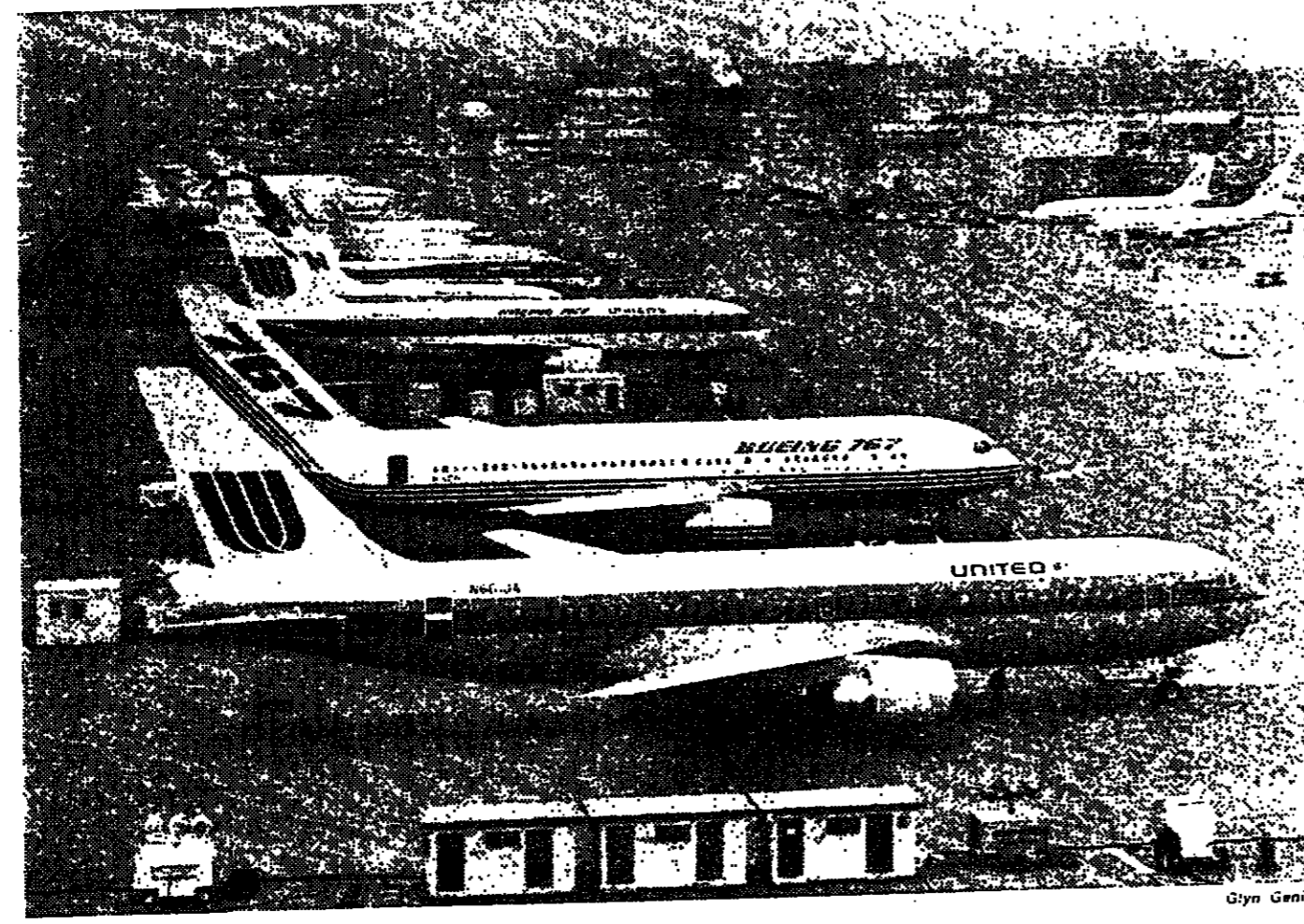
The interest rate problem is especially worrying, Mr Ray Copc, finance chief of the IATA, says: "We are in a loss area that we seem unable to get out of. By 1983, all financing will be by borrowing. The airlines are becoming hostage to the loan market. There will be more Laker and Braniffs by the time you get to 1984." One of the most significant effects of this situation is that the airlines are virtually unable seriously to contemplate at present significant new orders for the generation of "advanced technology" airliners they know they need. Those aircraft, with improved fuel efficiency, quieter engines, improved seating capacities and other benefits, could do much to help improve their overall financial situation, but they cannot afford to buy them just yet.

While a few orders are being placed with the manufacturers, the rate is substantially lower than in previous years. Moreover, most of these orders are coming from airlines in the Third World, where expansion has been less affected by the recession, and where governments are supporting the expansion of their airlines as instruments of political as well as economic policy. Nevertheless, the manufacturers are holding on grimly in the anticipation that brighter times lie ahead. The general hope now is that there will be an end to the recession, or at least a diminution of it, by the end of 1983.



World air passenger traffic is forecast to grow to over 1,200bn revenue passenger miles by the early 1990s, with most of the growth likely to occur outside the U.S.

Many airline executives, accustomed all their working lives to coping with the problems of over-rapid expansion, were faced with a slump and all its consequent problems—economic, industrial, social and managerial. The industry in general has coped well with the crisis. Despite all the problems, few airlines have gone out of business so far (although this may be due less to the skills of their managements than to the desire of their bankers not to lose the heavy investments already made in them).



The Boeing 767 twin-engine airliner on the flight line at the company's Seattle, Wash., factory. The aircraft is about to enter service with United Air Lines of the U.S.

Reactions

Most airlines have incurred heavy losses, and many continue to do so. Managements' reactions have been to retrench hard, with heavy labour lay-offs, cancellations or deferments of new equipment orders, the grounding and sale (where possible) of older, less-efficient equipment, and the elimination of unprofitable routes. It is now estimated by the International Air Transport Association that there are 150 wide-bodied and 200 narrow-bodied jet airliners for sale world-wide, equivalent to about 31 per cent of the world scheduled airline fleet in 1981. The pattern of the recession has been mixed. It has been worst in the U.S., where deregulation (with consequent fiercely increased competition) has compounded many of the economic difficulties already being experienced (contrary to some opinions, deregulation itself has not been the basic cause of those economic difficulties). The recession has also hit Western Europe hard, but it

airline service as it has been known in the past. Aircraft will become more crowded, there will be less leg room as airlines seek to squeeze in as many passengers as possible, and in some cases food service may have to be reduced in size. The airlines have paid considerable attention to the need to keep their passengers happy in a difficult economic situation, but in their present struggle for survival there is little they can really do to make their products as attractive as many of them would like.

What they can do, and are trying to do, is to improve the quality of service they offer in other directions. Overall, airline punctuality has improved in recent years although inevitably industrial disputes over which the airlines have no control (such as last year's air traffic controllers' disputes in the UK and U.S.) affect this situation. The overall safety record of the industry is also improving.

Although even one bad accident to a wide-bodied jet can significantly alter the statistics, figures issued earlier this summer showed that in 1981 there were only 355 passenger deaths compared with an average of 763 a year for each of the three preceding years, with only 12 jet airliner total losses in that year against an average of 21-22 for the three preceding years. The world scheduled airline industry is thus coping with the recession. The industry that is likely to emerge at the end of it will be slimmer and tougher, with many of the wasteful practices of the past eliminated. Airlines will be better geared to take advantage of any improvement in the economic climate. But even so, the heavy losses of the recent past will take years to wipe out, and the economic effects of the recession are likely to remain with the industry for a long time to come.

Michael Donne



Airlines have paid considerable attention to the need to keep passengers happy in a difficult economic situation.

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STAYING AHEAD IN THE RACE TO TOMORROW.

هكزان الأهم

UK ENERGY FORECASTS

The factions prepare for battle

By Ray Dafter, Energy Editor

THE GOVERNMENT is about to prefer a thick stick with which it is likely to be beaten...

The latest set of energy projections, now in the final stages of preparation, are likely to be seized upon by opponents of nuclear power...

You can sense that Mr Nigel Lawson, Energy Secretary, is beginning to wince. For a start, he has already sowed a seed of doubt about the likely accuracy...

It does not help us very much to guess the unguessable. It is a recent gathering of international energy economists...

Mr Lawson asserts that the traditional projections of UK demand and production, beloved of some previous governments...

Calculations kept carefully under wraps

are less relevant in an open energy market in which fuels are treated merely as traded commodities...

Mr Lawson concedes that forecasts can raise useful questions about the coherence of policy. More specifically, he reckons that projections of fuel demand help to set a context for planning in the electricity industry...

This is why Mr Lawson is prepared to publish, with some reluctance, new energy forecasts

to be considered at next year's public inquiry into the Sizewell B power station...

The Energy Department calculations are being kept securely under wraps for the time being. But significant pointers are to be found elsewhere...

For instance, the International Energy Agency has recently published UK projections, prepared in Whitehall last year, which suggests that overall energy demand could rise by over 25 per cent over the next nine years...

But in line with Mr Lawson's previous views—their forecasts should carry "Government health warnings"—the projections appear far too high in the current economic light...

As the Confederation of British Industry is at pains to point out, the recession is not over yet. Because of this UK energy consumption has continued to fall...

There are some within the energy industry who believe it could be another eight years or so before demand is restored to the 1973 level...

There can be little doubt that the figures will be seized upon by the opponents of nuclear



NIGEL LAWSON beginning to wince

was based on the assumption of a continuing growth in demand for products throughout the 1970s and 1980s.

It is the internal estimates of the Central Electricity Generating Board which, if shared by the Government, could stir up the most controversy...

In its statement of case to the Sizewell B inquiry the board carefully hedges its bets and provides a wide range of estimates.

However, the CEB's central, or most likely, view provides the most telling estimates. Based on an annual GDP growth rate of 1 per cent over the next two decades, the board's projection of fuel demand is not quite as bleak as that of the oil corporation...

To complicate matters, the estimates in the statement of case exclude fuel which is not used for energy purposes, such as oil bunkers and gas and oil for chemical manufacturing.

There can be little doubt that the figures will be seized upon by the opponents of nuclear

TOTAL UK PRIMARY ENERGY DEMAND

Table with columns for Oil, Solid fuel, Gas, Nuclear, and Total. Rows include 1973 (actual), 1981 (actual), 1990 (forecasts) for Dept. of Energy, Major oil company, Ray/Robinson, DRI Europe, and CEBG (central view).

Converted to 1m tonnes of coal equivalent = 0.6m tonnes of oil equivalent. 1 From International Energy Agency report...

power who will contend that the PWR station is not needed, or at least not needed yet. The CEBG will counter that irrespective of energy projections, the PWR will be a sound investment.

The board will base much of its argument on the need to demonstrate a new type of power plant in the UK, one which would form the basis of a nuclear building programme in the 1990s and beyond.

The way in which the two sides of the debate are now limbering up indicates that it will be a lively public inquiry, in which little quarter will be given.

The National Coal Board and the National Union of Mine-workers can take little comfort from the most recent estimates of UK energy demand.

In 1974—in the aftermath of the first major oil shock—the Government, unions and Coal Board drew up the "Plan for Coal" programme aimed at a total output of 135m tonnes by 1985.

70m-85m tonnes annually in the 1980s—from domestic sources then they will have to exploit a large number of new North Sea fields.

Similarly, the oil companies will point to the projected increase in demand for natural gas over the next couple of decades and will stress that this need will only be met from domestic sources if they are given incentives to exploit new fields.

The Energy Department is unmoved. "Why get hot under the collar about something that may or may not happen in 20 years time?" said one official.

Mr Lawson is also adamant. "The Government has no hot line to the future," he told the Energy Select Committee of MPs last month.

Dangerous to take major decisions in a vacuum

Such estimates must add urgency to the Coal Board's plan for shutting down old, uneconomic pits and replacing with modern, more cost-effective mines.

The fuel projections about to emerge from the Energy Department may be used by ministers and Coal Board officials to support their desire for a more rapid pit-closure programme.

But the forecasts will have wider significance. Oil companies will point out that if they are to meet UK demand for oil products—expected to be around

Lombard Conditionality for lenders, too

By Anthony Harris

IT WILL not be surprising if how to provide credit and liquidity without provoking any new inflationary excesses.

The central banks are bitterly aware that their attempts to restore confidence after the Herstatt collapse with the Basle Concordat of 1974 were only too successful.

However, a lender of last resort is not a fairy godmother. Open market operations can keep markets liquid and funds available at a price, but they cannot turn bad debts into good ones.

There is another danger which Mr Kit McMahon, deputy governor of the Bank of England, and Dr Leutwiler in Switzerland have pointed out: There is now a danger that commercial bankers will succumb to reckless expansionism to over-contraction of credit.

Discipline has its price, though. Banks which are locked into difficult situations, and forced to turn short loans into indefinitely long ones, have that much less to lend to anyone else—even if they wanted to, in their chastened state.

This resolves one obvious dilemma facing central banks: how to provide credit and liquidity without provoking any new inflationary excesses.

There is now a danger that commercial bankers will succumb to reckless expansionism to over-contraction of credit.

This resolves one obvious dilemma facing central banks: how to provide credit and liquidity without provoking any new inflationary excesses.

Letters to the Editor

Opportunities in European Development Fund works

From Mr B. Hord M.E.P. Sir—Mr King (August 12), has, in my view, responded to John Wyles' recent excellent article on the European Development Fund in a way that can only be described as defiant.

The Inland Revenue and punk legislation

From Mr A. Harper Sir—The latest Inland Revenue propaganda against tax avoidance (on the Delaware link) August 17, has sinister overtones. It emphasises the extent to which it has achieved ascendancy over its political (supposed) masters.

EDF has in fact shown a multiplier effect of seven. The scope for encouraging other funds such as the World Bank and Arab money enables many more larger projects to be contemplated by Lome countries...

If Parliament wishes to tax apples, it cannot tax oranges until it changes the laws (which it cannot do with retrospectivity and justice).

A recent hypocrisy is to divide tax avoidance into "artificial" (OK) and other (not OK). One man's tangerine, however, is another man's orange.

The real danger is precisely that this subjective test is operated in practice at the whim of the Revenue which is elected by no one.

Professional confidence does not allow all these unscrupulous and vindictive practices to be divulged but one general example will do.

Construction needs a boost

From Mr S. Leslie Sir—There are many good reasons for using construction to blow some life into the members of the British economy.

When threatened with costs up to the House of Lords. Sanctioned taxpayers who chortle about playing with fire should realise that the Revenue now regards every person who attempts to avoid tax by any method it decides to be unacceptable.

Job protection and creation

From Mr A. Kennaway Sir—Mr Stacey (August 12) is absolutely right. Orders for industry and the jobs dependent upon them will not come about through changes in taxes or through other government activity.

Given such an approach combined with a positive and constructive present attitude, rather than the present negative response to EDF works, the construction industry is in a fair way to benefit from the good reputation enjoyed by British firms.

There is an increasingly urgent need to modernise and replace Britain's ageing infrastructure. Even in the good times, this country devoted less of its national income to public capital investment than other developed nations.

Despite the extremely modest boost in the March budget (which in fact will amount to rather less than last year's underspend in the English trunk road budget), the short term outlook for construction remains gloomy.

Yet another news item on oil revenues does demonstrate that there is real scope for the Government to increase public spending without increasing borrowing or taxes.



This year marks the Golden Anniversary of Wheelock Marden and Company Limited, which was established as a publicly-listed company in Shanghai on 22nd August 1932.

The Head Office of the Wheelock Marden Group is located in Hong Kong and our interests include shipping, real estate, retailing, trading, insurance, manufacturing, share and money broking, travel and general investment activities.

Wheelock Maritime International (U.K.) Limited is the Group's Shipping Company in the United Kingdom and is principally engaged in leasing and chartering activities.

Duran Limited is the Group's other major operating UK Company. It is engaged in real estate particularly in London where several refurbishment and development projects are being undertaken.

The Wheelock Marden Group 1982 Our Golden Anniversary Year

Companies and Markets UK COMPANY NEWS

Independent Newspapers at £1.12m

TAXABLE PROFITS of Dublin-based Independent Newspapers moved ahead from £1.01m to £1.12m in the first half of 1982...

Mr A. J. F. O'Reilly, chairman, says the increase in turnover mainly reflects increases in cover charges and advertising rates in the Irish operations...

Exeter Bldg. reaches £391,000 midway

Exeter Building & Construction Group reports a rise in pre-tax profits for the six months to June 30, 1982...

This construction industry holding and management company says that trading margins are being steadily eroded in the current adverse climate...

Australian companies' coal deal

TWO BIG Australian coal projects have announced agreements to supply Japanese steelmakers with substantial tonnages of coal over the next three years...

although work has had to be fought for in fierce competition, the chairman, Mr D. Stoneman, says, New housing, commercial and industrial development projects are being directly by the group...

BOARD MEETINGS

Table listing board meetings for various companies including Anglo American, BAA, and British Airways, with dates and locations.

Midway slip at Ward Holdings

Pre-tax profits at Ward Holdings in the six months to April 4 1982 slipped from £310,000 in 1981...

PENDING DIVIDENDS

Dates when some of the more important company dividend statements may be expected in the next few weeks are given in the following table...

Table of pending dividends for companies like Anglo-Nordic, Anglo-Thai, Anglo-Tanzania, etc., listing dates and amounts.

RECENT ISSUES

Table listing recent issues of stocks and bonds, including Anglo-Nordic, Anglo-Thai, and Anglo-Tanzania.

FIXED INTEREST STOCKS

Table listing fixed interest stocks with their respective yields and prices.

"RIGHTS" OFFERS

Table listing rights offers for various companies, including Anglo-Nordic and Anglo-Thai.

SPERRY U.S. \$100,000,000 SPERRY CURACAO N.V. 15% NOTES DUE 1989. Advertisement for Sperry Curacao N.V. notes.

M. J. H. Nightingale & Co. Limited. Advertisement for financial services and investments.

THE TRING HALL USM INDEX. Advertisement for index services.

FINANCE FOR INDUSTRY TERM DEPOSITS. Advertisement for industry term deposits.

BASE LENDING RATES. Advertisement for various bank lending rates.

IBM Credit Overseas N.V. U.S. \$100,000,000 13 3/8% Notes due August 18, 1987. Advertisement for IBM credit notes.

Du Pont Overseas Capital N.V. U.S. \$200,000,000 14 1/2% Guaranteed Notes Due 1989. Advertisement for Du Pont capital notes.

July 20 1982

Companies and Markets

INTERNATIONAL CAPITAL MARKETS

CREDITS

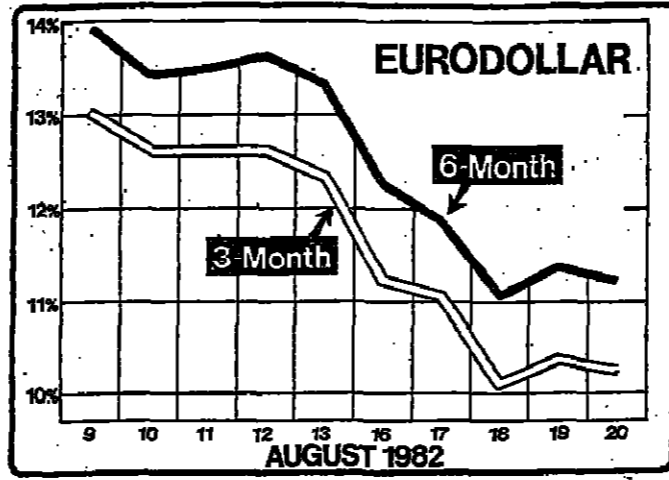
Mexico granted a short but vital breathing space

MEXICO LAST week won a vital breathing space in its efforts to overcome debt problems, which, from the point of view of sheer numbers, constitute the worst the Eurocredit market has ever seen.

INTERNATIONAL BONDS

Selective tone creeps into trading at the end of a hectic week

IT WAS a busy week for the World Bank last week. The Bank found itself issuing securities in dollars, D-marks, Swiss francs and guilders as interest rates headed decidedly lower.



Over the week as a whole six-month Eurodollars shed two points to 11 1/2 per cent, with D-mark rates down 1/2 at 8 1/2 and Swiss franc rates also down 1/2 point at 4 1/2 per cent.

The big impetus for these declines came last Tuesday when Dr Henry Kaufman, Chief Economist at Salomon Brothers, forecast that long-term U.S. bond rates would decline to between 9 and 10 per cent over the next year.

Despite a mild correction on Thursday prices were still moving ahead on Friday, although by then a distinctly selective tone had crept into trading in the wake of further developments on Mexico's debt problems.

Chase Manhattan's floating-rate notes also weakened somewhat, but in general dealers said such a reaction appeared overdone.

On average, prices were about 1/2 point higher on the day, but individual movements were very mixed as the market sought out quality paper and prices of some bonds issued by U.S. banks actually fell.

Mexican bonds themselves were sharply weaker on the week, particularly on the continent where the latest SwFR 80m issue by Nacional Financiera fell ten points to give a closing yield of 12.17.

A case in point were issues by Manufacturers' Hanover which stepped in briefly to support its paper in the Euro-market on Friday morning, although later in the day business

stabilised with two-way trading in the issues at a level about 1/2 point below the previous close.

moment, and it is thus thought, as well as the anticipation of still lower rates to come, that is clearly holding back borrowers of fixed-rate dollar Eurobonds who issued a total of only \$500m in new paper last week.

The fast moving market last week almost led bankers to forget completely a problem that on Monday had seemed likely to threaten the whole nature of the business.

Proposed new U.S. tax legislation that would have limited the ability of U.S. entities to issue bearer bonds in the Euro-market, was redrafted so that such bonds would simply have to carry a warning of the tax implications for U.S. citizens who buy them.

These implications include a provision that capital losses on such bonds are not tax deductible and capital gains must be treated as ordinary income.

Several bonds which had been held up while the legislation was redrafted were allowed to proceed by mid-week so that by Friday the whole issue had turned out to be a storm in a teacup.

Yields were thus falling much faster on the other side of the Atlantic which made new issues in that market more attractive to borrowers. A feature of last week was a spate of foreign issues in the New York market, including the 13 1/2 per cent issue for Norwegian Export Finance, which was raised to \$150m from an original \$100m.

This week Finland is also expected to tap the New York market for \$100m of five-year bonds with an issue led by Merrill Lynch expected to yield well under 14 per cent.

It would be much more expensive for Finland to tap the Eurobond market at the

moment, and it is thus thought, as well as the anticipation of still lower rates to come, that is clearly holding back borrowers of fixed-rate dollar Eurobonds who issued a total of only \$500m in new paper last week.

In Germany the capital markets sub-committee agreed on Monday a new issue calendar of 10 issues totalling DM 1.1bn for the coming month.

AUSTRALIAN PROJECT FINANCE

Banks may regret relaxing on risks

IT WOULD be a useful exercise for bankers involved in the recent spate of Australian project financings to compare how they described a potential project loan to a borrower and how they described it to their own credit committees. It is likely that there were some differences of emphasis, especially in the area of who was shouldering which risks.

It is too early to judge yet, but there are grounds for suspecting that some banks were so caught up with last year's boom in the Australian mineral and energy industries that they took project risks on their books which they may live to regret.

Eighteen months ago, banks were queuing up to lend on Australian projects. The country's political stability and undoubted mineral wealth made it a very attractive credit risk for international banks.

With the presence of several aggressive project advisors, representing the borrowers, and a desire by many banks to demonstrate their "commitment" to Australia in the hope that this might tip the balance when the Government makes up its mind on which foreign banks to allow in, the scene was set for some major advances in the banks' perception of acceptable project risk.

The recent history of project finance may have lulled some banks into a sense of false security. Throughout the 1970s rising energy prices provided a cushion for the substantial cost over-runs, delays and problems which might otherwise have jeopardised the financing of many of the projects.

There are a number of areas in recent financings where the banks have gone further in accepting project risks than hitherto has been the case.

Resource risk. Most banks require considerably more reserves to be available than is necessary to repay the project loan. Traditionally, lenders work on the basis of two times cover but the ratio has been reduced in some recent Australian projects to 1.5 times or less.

Completion risk. Banks have traditionally shied away from accepting the risk that projects will not be completed. However, several recent Australian financings have involved the banks effectively taking this risk on their books. Completion guarantees by the project sponsors have been replaced by weak "completion tests" and there is little to prevent some borrowers from walking away from a project which runs into difficulties.

Marketing risks. These can be divided into price and volume risks and despite the existence of long-term sales contracts some recent Australian project financings involve the banks taking an increasing risk on these scores.

William Hall

CURRENT INTERNATIONAL BOND ISSUES

Table with columns: Borrowers, Amount m, Maturity, Av. life years, Coupon %, Price, Lead manager, Offer yield %. Includes sections for U.S. DOLLARS, SWISS FRANCS, and D-MARKS.

This announcement appears as a matter of record only

Perpetual Trustee Company (Canberra) Limited as Trustee of

DELHI AUSTRALIA FUND

MANAGED BY

CSR LIMITED



Cooper Basin Petroleum Multicurrency Project Financing

US\$800,000,000

PRINCIPAL FACILITY

US\$50,000,000

STANDBY FACILITY

US\$100,000,000

CONTINGENT FACILITY

LEAD MANAGED BY

Bank of New South Wales, Chase Manhattan, Capital Markets Group, Continental Illinois National Bank and Trust Company of Chicago

Canadian Imperial Bank Group, Citicorp International Group, National Westminster Bank Group

PROVIDED BY

Bank of New South Wales, The Chase Manhattan Bank, N.A., Continental Illinois National Bank and Trust Company of Chicago

Canadian Imperial Bank of Commerce, Citibank, N.A., National Westminster Bank PLC

Bank of America NT & SA, LBI Australia Limited, Societe Generale

The Commercial Banking Company of Sydney Limited, SFE Banking Corporation Limited, Union Bank of Switzerland

Australia and New Zealand Banking Group Limited, Commonwealth Trading Bank of Australia, Mellon Bank, N.A.

Australian Industry Development Corporation, The Hongkong and Shanghai Banking Corporation, Sumitomo Bank Merchant Banking Group

AGENT

The Chase Manhattan Bank, N.A.

AUSTRALIAN AGENT

Bank of New South Wales

July 1982



US \$75,000,000

The Development Bank of Singapore Limited

15 1/2% Notes Due August 12, 1989

and 75,000 Warrants to Purchase US \$75,000,000 14 3/4% Notes Due August 12, 1989

- List of participating banks and financial institutions including Morgan Guaranty Ltd, Daiwa Europe Limited, Bank of Tokyo International Limited, etc.

August 12, 1982

All of these securities have been sold. This announcement appears as a matter of record only.

Companies and Markets

INTERNATIONAL CAPITAL MARKETS AND COMPANIES

U.S. BONDS

Yield curve steepens sharply as rally gathers momentum

A BUYING PANIC engulfed the U.S. securities market last week... The frenetic activity in the fixed income markets has been accompanied by unusually sharp declines in yields...

Against this background the Fed funds rate dropped to about 8.5 per cent late in the week from an average of around 10.10 per cent in recent weeks...

With interest rates already dropping all the markets appeared to need was for the economic gurus to change their tune... The yield curve steepened sharply to record differentials between short and long government bonds...

Fokker confident despite sluggish first six months

By Walter Ellis in Amsterdam

NET PROFIT at Fokker, the Dutch aerospace company, rose only slightly in the first six months of this year against the same period in 1981...

Agreement expected on Dome debts

By Robert Gibbens in Montreal

DOMESTIC PETROLEUM, the Canadian energy company, says talks with its bankers on debt restructuring continue, but no agreement has yet been reached...

Greyhound elects new chairman

GREYHOUND CORP. has elected Mr John W. Teets chairman succeeding Mr Gerald E. Trautman who retires...

Loss ahead at Allis Chalmers

By Our Financial Staff

ANOTHER "MAJOR loss" is expected this year at Allis-Chalmers, the Milwaukee-based machinery manufacturer...

Bell Canada rejects plea for inquiry

By Victor Mackie in Ottawa

BELL CANADA, the nation's largest supplier of telecommunications equipment, will not wait for a public inquiry before proceeding with a controversial reorganisation plan...

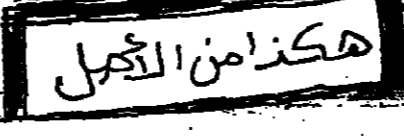
INTERNATIONAL APPOINTMENTS

- Mr Peter E. McMenemy, marketing director Textile Fibres Du Pont (UK), will become development manager DU PONT DE NEMOURS INTERNATIONAL SA... Mr George W. Tarleton, vice-president marketing, Utah International Inc., San Francisco, has been elected vice-chairman...

FT INTERNATIONAL BOND SERVICE

Table with columns for U.S. DOLLAR, YEN STRAIGHTS, OTHER STRAIGHTS, EURO BOND TURNOVER, STRAIGHTS, and CONVERTIBLE BONDS. Includes various bond listings with prices and yields.

AIR-INDIA advertisement. Includes logo, text: 'Guaranteed by The Republic of India', 'US\$ 198,000,000', 'Finance for the purchase of three A-300 B4 aircraft and related spare parts from Airbus Industrie...', and a list of banks providing financing.



Vertical text on the left margin: PRE MITI (25) a "c" can serv Right was bree A: Was tend ow piter wroth thin rest in Jack pron rebe that ferri and tax Reag port Ft still econ tion and age 1 From thou stem penc in N: He ing coit N O 51 A M 68 p June stren econ latest Th It were stre. where Ah 147 p will it will helle. ence. 16 p they had Th 25 Th A b THE ment ion over main with a v scher The prefe comp scher the l disag price price accrus deres incur the c In ACTI latter mont defect revese prote perfo outst The achle grow revese price fallin erum. Mfratic i' shal price more direct ing to Las whole foreit Eyr i rear 1982 ably Minis is wo doubt adopt Sr Ai Plann Lange The crisis sente frely over (a) c tion. curte repon away lato cultu and (g) et. Grazi The

Companies and Markets

NEW YORK

Table of stock prices for various companies in New York, including columns for High, Low, Stock, and Aug 20.

NEW YORK

Table of stock prices for various companies in New York, including columns for High, Low, Stock, and Aug 20.

NEW YORK

Table of stock prices for various companies in New York, including columns for High, Low, Stock, and Aug 20.

CANADA

Table of stock prices for various companies in Canada, including columns for High, Low, Stock, and Aug 20.

INDICES

Table of market indices including Dow Jones, S&P 500, and other regional indices.

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Table of market indices including Dow Jones, S&P 500, and other regional indices.

Notes and footnotes regarding the data, including a disclaimer about the accuracy of the information.

CURRENCIES, MONEY and GOLD

MONEY MARKETS

BY COLIN MILLHAM

A delicate shade of amber

THAT'S A long time in this market... commented a senior manager at one of the discount houses when asked his thoughts on the possibility of bank base rates falling into single figures by late October...

It can only be hoped that Dr Henry Kaufmann of Salomon Brothers — the man largely responsible for the amazing change in sentiment in the equity markets — is far less fallible than most other economic forecasters...

over the appropriate bill rates to relieve money market shortages. Worried about the heavy market sentiment the authorities refused to cut its dealing rates after the fall in base rates...

Although the houses are probably resigned to a rather more gentle fall in rates than seemed possible around the middle of the week, single figure base rates still seem likely by the late autumn.

WEEKLY CHANGE IN WORLD INTEREST RATES

Table showing weekly change in world interest rates for various locations including London, New York, Frankfurt, Tokyo, and Amsterdam.

BANK OF ENGLAND TREASURY BILL TENDER

Table detailing Bank of England Treasury Bill tender results for August 20, 1982, including amounts offered and accepted.

FT LONDON INTERBANK FIXING

Table showing interbank fixing rates for 3 and 6 months U.S. dollars.

LONDON MONEY RATES

Table showing London money rates for various currencies and instruments.

The fixing rates (Aug 20) are the arithmetic means rounded to the nearest one-hundredth of the bid and offered rates for volume quoted by the market...

EURO-CURRENCY INTEREST RATES (Market closing rates)

Table showing Euro-currency interest rates for various currencies and terms.

London-based 1 bill matures in up to 14 days, band 2 bills 15 to 33 days, and band 3 bills 34 to 63 days...

Table showing London-based 1, 2, and 3 month bills with their respective maturities and rates.

ECGD Fixed Rate Sterling Export Finance. Scheme IV Averaged Reference Rate for investment period 19 July to 3 August 1982 (inclusive): 12.143 per cent.

CURRENCIES AND GOLD

Dollar very weak

The dollar fell sharply last week in reaction to lower U.S. interest rates. The trend began on the previous Friday when the Federal Reserve cut its discount rate...

on Bank of England figures, fell to 120.2 from 122.4 during the week, and in terms of major currencies the U.S. unit weakened to DM 2.4650 from DM 2.3075 against the D-mark...

THE DOLLAR SPOT AND FORWARD

Table showing Dollar spot and forward rates for various currencies.

THE POUND SPOT AND FORWARD

Table showing Pound spot and forward rates for various currencies.

GOLD MARKETS

Table showing Gold market prices for various currencies.

Table showing Gold coins prices for various currencies.

FORWARD RATES AGAINST STERLING

Table showing Forward rates against Sterling for various currencies.

EMS EUROPEAN CURRENCY UNIT RATES

Table showing EMS European Currency Unit rates for various currencies.

OTHER CURRENCIES

Table showing exchange rates for other currencies including Argentina, Australia, Brazil, etc.

EXCHANGE CROSS RATES

Table showing exchange cross rates for various currencies.

FT UNIT TRUST INFORMATION SERVICE

Authorised Trusts section listing numerous investment funds and trusts with their details and performance metrics.

ACTI latter mont defter resce profo outout. The achre resce redue fallin erom ficial i shal price more direct ing to Las whole forei ght 1 year 1982 ably Mitis isis we doubt adopt Sr AI Plann Lange. The crisis sente forei over (a) c tion, curre expor the re anyw into cultu and (g) et Esazi The

INSURANCES

Table listing various insurance companies and their products, including Life Assurance, Fire Insurance, and Marine Insurance.

INSURANCE & OVERSEAS MANAGED FUNDS

Large table listing various insurance and overseas managed funds, including Life Assurance, Fire Insurance, and Overseas Managed Funds.

OFFSHORE AND OVERSEAS

Table listing offshore and overseas managed funds, including Life Assurance, Fire Insurance, and Overseas Managed Funds.

NOTES: Information regarding fund performance, currency fluctuations, and other relevant details.

FT SHARE INFORMATION SERVICE

WOLSELEY HUGHES Central to Britain's heating Heating and Plumbing Merchants. Farm and Garden Machinery, Engineering, Plastics.

LOANS—Continued. Table with columns: Interest, Stock, Price, Last, Bid, Offer, Yield.

BANKS & H.P.—Cont. Table with columns: Dividend, Stock, Price, Last, Bid, Offer, Yield.

CHEMICALS, PLASTICS—Cont. Table with columns: Dividend, Stock, Price, Last, Bid, Offer, Yield.

ELECTRICALS—Continued. Table with columns: Dividend, Stock, Price, Last, Bid, Offer, Yield.

BRITISH FUNDS

Table of British Funds with columns: Name, Price, Last, Bid, Offer, Yield.

Building Societies

Table of Building Societies with columns: Name, Price, Last, Bid, Offer, Yield.

FOREIGN BONDS & RAILS

Table of Foreign Bonds & Rails with columns: Name, Price, Last, Bid, Offer, Yield.

ENGINEERING

Table of Engineering stocks with columns: Name, Price, Last, Bid, Offer, Yield.

MACHINE TOOLS

Table of Machine Tools stocks with columns: Name, Price, Last, Bid, Offer, Yield.

HOTELS AND CATERERS

Table of Hotels and Caterers stocks with columns: Name, Price, Last, Bid, Offer, Yield.

Five to Fifteen Years

Table of Five to Fifteen Years funds with columns: Name, Price, Last, Bid, Offer, Yield.

AMERICANS

Table of American stocks with columns: Name, Price, Last, Bid, Offer, Yield.

Hire Purchase, etc.

Table of Hire Purchase, etc. stocks with columns: Name, Price, Last, Bid, Offer, Yield.

DRAPERY AND STORES

Table of Drapery and Stores stocks with columns: Name, Price, Last, Bid, Offer, Yield.

INDUSTRIALS (Misc.)

Table of Industrial (Miscellaneous) stocks with columns: Name, Price, Last, Bid, Offer, Yield.

INDUSTRIALS (Misc.)

Table of Industrial (Miscellaneous) stocks with columns: Name, Price, Last, Bid, Offer, Yield.

Over Fifteen Years

Table of Over Fifteen Years funds with columns: Name, Price, Last, Bid, Offer, Yield.

BEERS, WINES AND SPIRITS

Table of Beers, Wines and Spirits stocks with columns: Name, Price, Last, Bid, Offer, Yield.

BUILDING INDUSTRY, TIMBER AND ROADS

Table of Building Industry, Timber and Roads stocks with columns: Name, Price, Last, Bid, Offer, Yield.

ELECTRICALS

Table of Electrical stocks with columns: Name, Price, Last, Bid, Offer, Yield.

Index-Linked & Variable Rate

Table of Index-Linked & Variable Rate funds with columns: Name, Price, Last, Bid, Offer, Yield.

UNDATED

Table of Undated funds with columns: Name, Price, Last, Bid, Offer, Yield.

INT. BANK AND O.E.A.S GOVT. STERLING ISSUES

Table of International Bank and O.E.A.S Govt. Sterling Issues with columns: Name, Price, Last, Bid, Offer, Yield.

CORPORATION LOANS

Table of Corporation Loans with columns: Name, Price, Last, Bid, Offer, Yield.

CANADIANS

Table of Canadian stocks with columns: Name, Price, Last, Bid, Offer, Yield.

BANKS AND HIRE PURCHASE

Table of Banks and Hire Purchase stocks with columns: Name, Price, Last, Bid, Offer, Yield.

LOANS

Table of Loans with columns: Name, Price, Last, Bid, Offer, Yield.

COMMONWEALTH AND AFRICAN LOANS

Table of Commonwealth and African Loans with columns: Name, Price, Last, Bid, Offer, Yield.

COMMONWEALTH AND AFRICAN LOANS

Table of Commonwealth and African Loans with columns: Name, Price, Last, Bid, Offer, Yield.

BANKS AND HIRE PURCHASE

Table of Banks and Hire Purchase stocks with columns: Name, Price, Last, Bid, Offer, Yield.

LOANS

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LOANS

Table of Loans with columns: Name, Price, Last, Bid, Offer, Yield.

U.S. Corporate Information 01-236 9502. Financial information and much more now available by return. NEW YORK STOCK EXCHANGE / AMERICAN STOCK EXCHANGE / OVER-THE-COUNTER MARKET. Includes image of Statue of Liberty.

هكمان الكحل

INDUSTRIALS—Continued

Table of industrial stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

LEISURE—Continued

Table of leisure stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

PROPERTY—Continued

Table of property stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

INVESTMENT TRUSTS—Cont.

Table of investment trusts with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

OIL AND GAS—Continued

Table of oil and gas stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

MOTORS, AIRCRAFT TRADES

Table of motors and aircraft trades stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

SHIPPING

Table of shipping stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

SHOES AND LEATHER

Table of shoes and leather stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

MINES—Continued

Table of mines stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

NIKO THE NIKO SECURITIES CO. LTD. An integrated approach to investment and finance. Ntko House, 77 Godalman Street, London, EC4 9JL. Tel: 248-9811 Telex: 884717

MISCELLANEOUS

Table of miscellaneous stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

INSURANCE

Table of insurance stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

PROPERTY

Table of property stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

TOBACCO

Table of tobacco stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

TRUSTS, FINANCE, LAND

Table of trusts, finance, and land stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

MINES

Table of mines stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

REGIONAL AND IRISH STOCKS

Table of regional and Irish stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

LEISURE

Table of leisure stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

PROPERTY

Table of property stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

TOBACCO

Table of tobacco stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

TRUSTS, FINANCE, LAND

Table of trusts, finance, and land stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

MINES

Table of mines stocks with columns for Stock, Price, Last, Bid, Offer, Div, Yld, and PE.

OPTIONS

Table of options with columns for 3-month Call Rates.

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TUC faces a stormy Congress

BY JOHN LLOYD, LABOUR EDITOR

THE TUC will be faced with an historic decision at its Congress in Brighton in two weeks' time: whether to maintain a 20-year relationship with government...

Tebbit hints at grant cut

MR NORMAN TEBBIT, the Employment Secretary, yesterday said he was considering ending government payments to the TUC for education of union officials.

Prior's plea over jobless figures rejected

AN APPEAL by Mr James Prior, Northern Ireland Secretary, for a change in government policy to reduce "intolerable" unemployment, was rejected yesterday by Mr Norman Tebbit, Employment Secretary.

THE LEX COLUMN

Running risks in Mexico

An alarming feature of the present Mexican debt crisis is the time which it has taken to dawn on the international banking community. Only a fortnight ago, the Mexican Government was looking forward to completion of a \$150m short-term Eurocredit on terms which top corporate borrowers would consider highly acceptable.

TV contract threatens union partnership

BY JOHN LLOYD, LABOUR EDITOR

THE FUTURE of one of the Labour movement's most famous literary partnerships may be in doubt because of a storm in a television studio.

supported for a "national economic assessment" embracing earnings and incomes carried out by the TUC and its future Labour and amendment cannot find a compromise then Congress could face a further major debate on its attitude to incomes policy and its role in the planning process.

Foam fears hit sales of insulation

By Andrew Taylor

SALES of a wide range of home insulation products have slumped and companies using urea-formaldehyde (UF) foam cavity wall insulation are facing serious financial problems following a television news report on allegations of possible health hazards.

Lay-offs at BSC and Dunlop

BY IAN RODGER

TWO MORE big employers have announced lay-offs which together will affect 8,500 workers next week.

British resorts fight for tourists

BY JAMES McDONALD

BRITAIN'S seaside resorts, many suffering their worst post-war holiday season, are to make more vigorous attempts to sell themselves through high street travel agents and inland tourist information centres.

Schmidt warns of international trade war

BY JONATHAN CARR IN BONN

CHANCELLOR Helmut Schmidt of West Germany has warned that an international trade war could break out, destroying jobs and returning the western world to conditions similar to those of the early 1930s.

Weather

COOL, showers, clearing from West and S England, S Wales. Sunny intervals, showers, heavy in E, drying out in W. Max 18C (64F).

Worldwide

Table with columns for location, temperature, and weather conditions. Includes cities like Ajaccio, Algiers, Athens, etc.

A new way to settle DM transactions

DM Eurobond transactions can now be settled on German domestic terms delivery against payment. In association with the Deutscher Auslandskassensverein (AKV) and using a computer link with the German Effektingiro, CEDEL can ensure a safe, fast, efficient and comprehensive clearing service for all DM Eurobonds...

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